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CONTRIBUTIONS FROM THE GRAY HERBARIUM
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THE SEVENTH CENTURY OF ADDITIONS
TO THE FLORA OF VIRGINIA

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(Plates 717–744)

PART I. HIGH LIGHTS OF FIELD-TRIPS IN 1941

My records show that from September, 1933, to August, 1940, my companions and I, in 30 trips of three days to two weeks each in tidewater Virginia, had collected approximately 650 flowering plants and vascular cryptogams not previously recorded as definitely growing in the state. In addition, of course, there are many species, like *Burmannia biflora*, which had long been supposed to be extinct in the state but for which living stations are now known. The results of our four trips in 1941, supplemented by old collections not previously worked out, brought the returns to 751. This brief statement is here made to clarify the title of the present paper. It should not be inferred that there are six preceding reports with essentially similar titles.¹ Unfortunately the present title is misleading, in that

¹ The preceding papers on the work in Virginia are as follows: Fernald & Griscom, *Three Days of Botanizing in Southeastern Virginia*, RHODORA, xxxvii. 129–157 and 167–189, 20 plates (1935)—Contrib. Gray Herb. CVII; Fernald, *Midsummer Vascular Plants of Southeastern Virginia*, RHODORA, xxxvii. 378–413 and 423–554, 22 plates (1935)—Contrib. Gray Herb. no. CIX; Fernald, *Plants from the Outer Coastal Plain of Virginia*, RHODORA, xxxviii. 376–404 and 414–452, 13 plates (1936)—Contrib. Gray Herb. no. CXV; *Local Plants of the Inner Coastal Plain of Southeastern Virginia*, RHODORA, xxxix. 321–366, 379–415, 433–459 and 465–491, 14 plates (1937)—Contrib. Gray Herb. no. CXX; *Noteworthy Plants of Southeastern Virginia*, RHODORA, xl.

364-424, 434-459 and 467-485, 27 plates (1938)—Contrib. Gray Herb. no. CXXIII; *Last Survivors in the Flora of Tidewater Virginia*, RHODORA, xli. 465-502, 529-559 and 564-577, with 14 plates (1939)—Contrib. Gray Herb. no. CXXVIII; *A Century of Additions to the Flora of Virginia*, RHODORA, xlii. 355-416, 419-498 and 503-521, with 24 plates (1940)—Contrib. Gray Herb. no. CXXXIII; *Another Century of Additions to the Flora of Virginia*, RHODORA, xliii. 485-553, 559-630 and 635-657, with 26 plates (1941)—Contrib. Gray Herb. no. CXXXIX.

Since the publication of the previously enumerated reports on our work in southeastern Virginia a paper by another "furriner" has appeared: the *Check List of the Ferns and Flowering Plants of the Seashore State Park, Cape Henry*, by FRANK E. EGLER, published by the New York State College of Forestry (February 1, 1942). The almost pioneer work on the region by Kearney in 1898 is mentioned; but no records are taken from Kearney's enumeration of species nor is his well known cautious scientific method followed. Clearly cited by Kearney were many species of Cape Henry which will not be new discoveries when others find them there: *Andropogon virginicus* var. *tetrastachyus* (*A. tetrastachyus*), *Panicum oligosanthes* (*P. pauciflorum*) *Cyperus diandrus* and *C. Grayi*, *Eleocharis flavescens* (*E. ochreatea*), *E. microcarpa* (*E. "prolifera"*), *Rhynchospora cymosa*, *Myrica cerifera* (difficult not to see), *Drosera intermedia*, *Physalis maritima* (*P. "viscosa"*), *Solanum nigrum*, and others. Kearney's work was done in 1898 and his report was so familiar as to be specially noted by the author of the *Check List*. He did not have for it the sophisticated excuse for neglecting the species enumerated in it which he assumed for the later and somewhat intensive collecting at Cape Henry done in 1933 by Griscom and me, in 1934 by Long and me, and in 1935 by Griscom, Long, Fogg and me. This work is easily dismissed by the following sentence: "The results of the intensive investigations of R. F. Fernald [whoever he may be] on the Flora of southeastern Virginia are continuing to come from the press, and it is believed that until tidewater Virginia again becomes quiescent, a paper of this type should adhere to the status quo" (Egler, p. 15). Just what is the "status quo" is not explained. The author might have stopped with Gronovius or, at least, with Kearney, instead of disturbing the "quiescent" state of knowledge by including in a list of Virginian plants names, like *Carex Kobomugi*, *Juncus effusus* var. *costulatus*, *Euphorbia supina* and *Vaccinium marianum*, which are not in any of the manuals listed as establishing the aforementioned status.

And why desecrate very violently this sacred status by intruding into the *Check List* species which are really not known from Virginia? *Cyperus dentatus* is listed (p. 5) as an ecological ingredient of "The Panicum-Ammophila Community". This very definite species, inhabiting pond- and river-margins from Quebec to Delaware and Maryland, would not be expected by those who know it to associate with *Ammophila breviligulata*, *Panicum amarum*, *Uniola paniculata* and *Iva imbricata*, and especially south of Chesapeake Bay. The specimen so identified (preserved at the New York Botanical Garden) is of the semicosmopolitan and aggressive weed, *C. esculentus*. "The Quercus cinerea Community" (p. 7) is made to include the Century-plant, *Agave americana* (on p. 8), although in the *Check List* (p. 28) it appears as the wholly different *A. virginica*. *Agave americana*, it seems almost superfluous to say, is a Mexican species, though now somewhat naturalized in southern Texas and in Florida; while in Virginia *A. virginica* is quite unknown from the tidewater counties. Incidentally, though most important, *Agave* has the characteristic inferior ovary of the *Amaryllidaceae*. The specimen collected by Egler is in fruit; it has the superior capsule subtended by the persistent perianth and came from a plant of the common *Yucca* of sands of southeastern Virginia. It was properly listed by Kearney. "The Juncus Community" (p. 8) contains "*Rumex persicaria*", changed on p. 32 to *R. Patientia*. There is no described species called *R. Persicaria*, though *R. persicarioides* is a rare plant of the coast from the lower St. Lawrence to New England and on the Pacific slope; and *R. Patientia* is, in America, common only in Newfoundland, Canada and the northern states, not generally south of the District of Columbia. Egler's material belongs to the almost cosmopolitan weed of disturbed soils, *R. crispus*. "The more common species of the pine-oak-hickory forest" include "*Carex gravida*" and "*Agave americana*"; and others which are undoubtedly present. The fact, however, that *Carex gravida* is a characteristic species of low prairie and bottomlands,

the actual record is here brought above the middle of the eighth century.

In 1941 Mr. Bayard Long and I could not get back to our headquarters south of Petersburg until June, our field-work then covering the period of June 11–21. Our former drivers all being unavailable, we drew for this trip a lively and temperamental young man, keen on fast but very skillful driving but far keener on stunt-flying. It was most difficult for him to understand how anyone could be interested in things terrestrial and to believe that we had not made the journey to Virginia primarily to let him scare the lives out of us by taking us up and exhibiting his stunts; and he disliked to keep his car within the ordinary speed expected on Virginia roads. We consequently covered intermediate territory quickly and got promptly to remote points needing exploration. Our driver, like the proverbial

as yet not authoritatively recorded from east of southern Ontario, Ohio and Missouri, might have led to caution, not to disturb the status quo. Many such plants are on the calcareous bottoms of tidewater Virginia but not on the dune-sands of Cape Henry. The plant collected by Egler is the common and usually abundant *C. Muhlenbergii* of dry and sterile soils from southern Maine to Florida and westward. "*Sabatia brachiata*" (p. 13) of "*The Tidal Marsh Zone*" is presumably *S. stellaris*, an annual with pink or white flowers on scattered and elongate alternate peduncles, a species which really grows on tidal marshes, already so noted by Kearney. *S. brachiata* is a very different plant of dry pinelands, a square-stemmed biennial with opposite branching and crowded flowers in dense corymbiform panicles.

Had the author embraced the opportunity, freely offered him when he was there, to check over the collection from Cape Henry in the Gray Herbarium, he might have eliminated some misidentifications; at least he could have added many conspicuous and still more rather inconspicuous species to his list: *Lycopodium inundatum* var. *Bigelovii*, *Triodia Chapmani*, *Aristida lanosa*, *Paspalum supinum*, *Panicum rhizomatum* and many others, *Cyperus densicaespitosus*, *Psilocarya scirpoides* var. *Grimesii*, *Rhynchospora fascicularis*, *Carex Walteri* var. *brevis*, some species of *Xyris*, *Spiranthes gracilis*, *Cassia nictitans*, the very handsome *Centrosema virginianum*, *Desmodium Dillenii* and *strictum*, *Lespedeza Stuevei* and *stipulacea*, *Ludwigia brevipes*, *Polypremum procumbens*, *Linaria canadensis*, *Utricularia subulata*, *Oldenlandia uniflora*, *Eupatorium serotinum*, *Solidago erecta*, *Aster undulatus*, *Gnaphalium calviceps* (type from Cape Henry), *Bidens discoidea*, *Hieracium venosum*, and many more.

In fact, study of a single well known work on a single genus, Hitchcock and Chase's *North American Species of Panicum* (1910), would have considerably extended the *Check List*. Egler includes a total of only 8 species of this large genus. Hitchcock and Chase definitely cite from Cape Henry 10 others. The collectors noted by them of only one species at Cape Henry (*P. aciculare*) are enumerated as Chase, Hitchcock, Kearney, Mackenzie and Williams; while under another (*P. scoparium*) Coville and Noyes are also cited as having collected at Cape Henry. In short, the number of botanists who preceded the author of the *Check List* in making collections at Cape Henry is considerable. Unless the intellectual curiosity of those who visit this unique area is to be completely satisfied by a mere quiescent status quo, it is evident that, without disturbing that comfortable and unprogressive condition of *laissez faire*, a much more complete check list could be prepared simply by consulting the many collections and records made by those who visited Cape Henry before it became a State Park.

sailor, had or formerly had girl-friends at many points about the southeastern counties and he introduced us to new areas and to homes in the country, where, without his introduction, we should not have ventured. We also, of course, returned to many familiar areas for special plants.

The marly bluffs and the beaches and marshes of the lower James in Surry and Isle of Wight Counties had, in 1940, yielded such a concentrated upland calcicolous flora, that we promptly returned there. Going back to Bailey's Beach, near Rushmere, for good material of *Carex decomposita*, discussed in the last paper, we found that here, as at other points along the lower James, *Carex Mitchelliana* M. A. Curtis was a regular inhabitant of the cypress swamps and that *C. hyalinolepis* Steud. was a dominant species of swales, these two species previously not often noted. In the slightly brackish swale near the settlement the northern (Newfoundland and lower St. Lawrence southward) *C. hormathodes* abounded, here at its probable southern limit. At the resort, Burwell's Bay, *Bromus racemosus* (new to Virginia) was among the weeds; the relatively rare *Torilis japonica*, previously found on the shore in Prince George County, was well established; and a colony of Timothy interested us, because of its very slender spikes and smoothish spikelets. It proves to be *Phleum pratense*, var. *nodosum* (L.) Richter, a well known European plant not previously recorded, I think, as established in America.

Aiming to reach the James at a new point, we discovered that by following an old cart-road along the border of a cultivated field we could get to a remarkably undisturbed stretch of shore, with steep wooded slopes, dripping marl-bluffs up to some scores of feet in height, and a broad sandy beach. At the border of the field and along the boundary-fence a purple-tinged weedy *Bromus* was new to us, the infrequent *B. arvensis*, cited by Hitchcock (*Man.*) only from Maryland, there rare. Near-by the woods were monopolized for a good portion of an acre by a continuous mass of *Leucojum aestivum* L., obviously derived from ancient plantings about the now extinct old mansion; and the lady occupying the modern residence told us that in early spring neighboring woods are carpeted with extensive colonies of *Narcissus*. Descending the steep wooded slope, we proceeded

to the dripping, white limy bluffs toward Fort Boykin. In RHODORA, xliii. 654, pl. 695 (1941), I described and illustrated from these and neighboring marl-bluffs the puzzling and very characteristic *Erigeron scaturicola*, the type collected at this station in June, 1941. In fact, the whole slope, wherever there was sufficient stability for vegetation to get a foothold, was a marvel when one thought of it as on the Coastal Plain midway between the Piedmont and the Atlantic shores. The upland continental calcicoles of the region have been sufficiently emphasized in past accounts, but we were still tempted by the largest specimens we had ever encountered of many species: *Elymus virginicus* between three and four feet high, *Solidago arguta* with basal leaves more than a foot long, and *Senecio obovatus* nearly 2 feet high, with rosette-leaves 6 inches long. With these overgrown plants of fertile soils *Zizia aurea*, the first we have found on the lower James, abounded; and there was a meagre representation of the strange variation of it with few rounded leaflets, forma *obtusifolia* (Bissell) Fernald. The *Oxalis europaea*, ordinarily with orange-yellow petals, here had them of a pale lemon-color; and here we found a small representation of *Osmunda Claytoniana*, the common northern and upland Interrupted Fern, the first we have encountered in the tidewater counties. The two great novelties in June, however, besides the *Erigeron*, which we had first noted near Burwell's Bay in late summer of 1940, were very exciting. Typical *Heuchera americana*, as currently understood, is a nearly glabrous plant, with smooth or only remotely hispid petioles and scapes. It and some closely similar variations abound in the richer woodlands of southeastern Virginia. But here, on these dripping bluffs of concentrated lime, the *Heuchera* was gigantic, with panicles up to 1½ feet long, and the petioles and scapes were heavily invested in masses of gland-tipped hairs of varying length. It is a novel plant, to be described and illustrated (PLATE 721, FIGS. 2 and 3) in Part II, somewhat simulating the two varieties of the Interior, in Arkansas, Missouri and southern Illinois, southern Indiana and Tennessee. While collecting this strange new *Heuchera* I came upon a single individual of an even stranger *Rubus*, in appearance like a blend of a dewberry and a stiffly upright blackberry, covered with cat's-claw prickles and with very prolonged and stiffly erect soli-

tary axillary pedicels. It was quite unlike any *Rubus* recognized in the Northern States and we spent some time vainly searching for another plant. We obviously were not in its true home, a nearly vertical, wet bluff of lime-marl perhaps 75 feet high, but another season's search in the dry woods and pastures back of the bluffs may reveal it. This doubly unique plant proves to be a new member (PLATE 723) of the remarkable subsection *Anormi* of *Rubus* § *Arguti*, the described species of the subsection being two in Florida, one in Oklahoma. The bluffs of the lower James were maintaining their individuality!

Other points along the James gave us new stations for *Cimicifuga racemosa*, *Euonymus atropurpureus*, *Tilia heterophylla* and other nice things, but our greatest surprise was when our driver took us out to Flowerdew Hundred, near Windmill Point, in Prince George County. Being a friend of the present owners, the Moody family, he did not hesitate, as we should have done, at the closed gates and the "posted" signs along the roads; and the maze of forking country-roads was to him without intricacies. Mrs. Moody kindly allowed us to drive along a planted field to the river. Among the farm-weeds one deserves special note, the tiniest-fruited *Capsella* we had ever seen, a plant which proves to be the European *C. gracilis* Grenier, evidently new to North America. In June of 1941 we were completing the comparisons of freshly flowering *Justicia*, reported on in the last of these Virginia papers. After passing through phenomenally abundant *Ptelea trifoliata* and a new and inland extension of *Bumelia lycioides*, var. *virginiana*, we came to the tidal shore, where *Justicia americana* makes dense carpets. Kneeling to examine its fresh flowers, I suddenly changed my objective. There, amidst the *Justicia* rhizomes, was the little simple-leaved and apetalous, subulate-fruited *Cardamine Longii* Fernald, supposed to be an endemic of tidal shores of Cathance River in Sagadahoc County, Maine. The James River and tiny Cathance River in Maine are 600 miles apart; and here was certainly the reputedly most local member of the genus in eastern America. Chuckling over our new discovery, for here was another of the isolated and ecologically very exclusive estuarine species sharing unglaciated southern Virginia with glaciated southern Maine, another link in the long chain of evidence of relict endemism

within the latter region, we selected nice specimens until nearly dark. Then the obvious thing to do was to try another tidal shore, this time at Jordan Point, up-river, where repeatedly we had combed the vegetation at the river-margin. The previous comb had apparently been too coarse or its manipulation too superficial, for in three minutes we had *Cardamine Longii* there, fine plants in great abundance. Since a specialty of Philadelphia botanists from Conrad and Nuttall to the present generation has been the tidal flora of the Delaware and since Long has particularly devoted his attention to these oozy and slimy flats, it was difficult not to accuse him of negligence in having there overlooked so remarkable a member of the estuarine flora and, especially, his own namesake.

Our duty was clear. The range in Virginia of *Cardamine Longii* must be worked out. So, very promptly, we journeyed to the head of tide on the Chickahominy. There it was, bigger and better than on the James. Then back to our old tidal-flat stations on the Mattaponi, near Horse Landing and King William Courthouse in King William County. *C. Longii* abounded, some plants $1\frac{1}{2}$ feet high, where in August, September and October of preceding years we had crept on hands and knees among the vegetation; and when Mr. Walker gave us permission to explore the flat above his landing at Walkerton, we found it in delightful profusion on the north side of the Mattaponi, in King and Queen. In June we were unable to trail it farther north but later in the year we got it on the Rappahannock. Returning to Philadelphia, Long conscientiously reexplored the proper spots along the Delaware and finally wrote me that it was no use; *C. Longii* is not on the flats of the Delaware. When, however, on our next trip to Virginia, he joined me on the train, one of the first tricks he pulled from his pocket was a long envelope containing the evasive plant from the head of Chesapeake Bay, near the mouth of the Susquehanna.

Desiring, if possible, to find where the lush calcicolous and upland vegetation stops as one goes down the lower James and more definitely reaches Chesapeake Bay, we picked out the bluffs north of Eclipse in Nansemond County, between the mouths of Chuckatuck Creek and Nansemond River. We there were surely beyond the calcicolous flora; and, it being a hot and

breathless day, we struggled through tall and rather ordinary shore-vegetation until we found a good place for siestas. On a cool day the region may prove interesting. At least, at the base of the wooded bluff and back of the beach there is an extensive thicket of a slender and arching but rather wiry blackberry, with remarkably small leaves and glandular pedicels, clearly related to *R. pauxillus* Bailey, a little known Virginia endemic, but much taller, more widely branched and with quite different leaflets (see PLATE 722).

Other localities, mostly already familiar, were visited. These need only brief mention. Rich or bottomland woods along the Nottoway near Huske contained very definite upland *Vitis Baileyana*, now in flower; and near it the *Cornus Amomum* was perplexing because it lacked the usual reddish hairs of the foliage. *Carices* were mostly too old to collect but one colony of plants was an evident hybrid of *C. abscondita* and *C. laxiculmis*, a hybrid we had once before collected, near Hotwater (an appropriate place for such puzzles). Other colonies were as clearly a cross of *C. digitalis* and *C. laxiculmis*, the plant treated by Mackenzie as a good species, *C. copulata* (Bailey) Mackenz. In the argillaceous clearing north of Orion in Greenville County, not far from Readjuster Bridge, there is a big sprangling and long-arching blackberry with jagged-margined leaflets. I have tried to make it something different but it seems to be inseparable from *Rubus recurvans*, one of the common species of Nova Scotia and northern New England, only doubtfully recorded from so far south as Virginia. Carpets of *Panicum* in fine anthesis were very striking on account of their color, one area with the plants blue-green, another with them yellowish. The difference is, apparently, due to different nutrient salts, for morphologically they are both *P. meridionale*, var. *albemarlense*. In this same clearing, which has yielded several notable plants, we had previously collected an extreme of *Carex debilis*, a new variety which I have recently (RHODORA, xliv. 307) described as var. *intercursa*, a plant as yet known only from southeastern Virginia and from eastern North Carolina.

A short visit to bottomlands of the Meherrin, near Gaskins, extended the range of the handsome *Carex Bayardi* Fernald in RHODORA, xliv. 71 (1942) into Greenville County; and here we

also extended southward the range of *Quercus palustris* and got into deeper perplexities than heretofore in *Stachys*; while throughout the trip *Ruellia* proved quite as baffling. The species of the latter genus are not at all satisfactorily worked out. Conscientious collecting in flower and in fruit is necessary before its complexities will be solved.

Furthermore, when we returned to Varina for additional specimens of the *Heuchera* with thin and glabrous leaves subtruncate at base, discussed a year ago and described and illustrated (PLATE 721, FIG. 1) in Part II, we found it accompanied by the characteristic inland variety of *Scutellaria ovalifolia* Pers., the plant described by Short from Kentucky as *S. hirsuta*. Typical *S. ovalifolia*, common in eastern Virginia, is closely pilose with mostly incurved short hairs. Our plant, with long and straight pubescence, is the first from east of West Virginia and Kentucky, except for an old and misidentified specimen from Wytheville, which lies beyond the Blue Ridge. The wooded slope near Varina justifies our original evaluation of it.

If botanical science is the rational subject it is sometimes supposed to be it is obvious that progress should be made along rational lines. In the past some of our best localities in Virginia, the four areas of pine barren, one in Nansemond County, two in Isle of Wight and one in Southampton, and our little sphagnous bog near Dahlia in Greensville County, where *Burmannia biflora* forms a carpet and where *Oxypolis ternata* (Nutt.) Heller and *Zigadenus densus* (Desr.) Fernald have their only Virginian colonies and *Calamovilfa brevipilis* var. *calvipes* Fernald its only known station in the world,—these had all been discovered by sheer good luck or happy chance. The best of the four pine barrens is the extensive one, stretching from slightly below George's Bend on the Blackwater into Gates County, North Carolina. Here, associated with the dominant Catesby's Oak, *Quercus laevis* Walt., Turkey-Oak, *Q. cinerea* Michx., and remnants of the old forest of Long-leaf Pine, there are more specialties than in any of the others, although some are shared with at least one of them: *Sphenopholis filiformis* (Michx.) Vahl, *Rhynchospora pallida* and *R. distans* (Michx.) Vahl, *Tradescantia rosea* var. *graminea* (Small) Anderson & Woodson, *Juncus abortivus* Chapm., *Lilium Catesbaei* var. *Longii* Fernald, *Calo-*

pogon pallidus Chapm., *Zenobia pulverulenta* (Bartr.) Pollard, *Vaccinium crassifolium* Andr., *Pyxidantha barbulata*, *Eupatorium tortifolium* Chapm., and several others not recognized as Virginians ten years ago. When, in early 1941, the Bureau of Plant Industry in Washington issued the report on the *Soil Survey of Isle of Wight County, Virginia*, following earlier reports on Nansemond and Southampton Counties, our course seemed very clear. The great pine barren of southwestern Nansemond County was definitely designated as "Norfolk sand" and the assumedly authoritative and up-to-date text (dated February, 1941) stated, without a word of qualification, that all the areas of "Norfolk sand" were in primitive and uncultivated condition: "**Norfolk sand.**—Norfolk sand . . . is inherently poor in mineral plant nutrients and organic matter, and none of it is cultivated . . . At present it supports a good stand of second-growth forest" (Soil Surv. Isle of Wight Co., Va. 26, 27). But, as we quickly discovered, dogmatic assertion without the facts is very different from simple demonstration through the actual facts!

Since the Soil Survey maps of Nansemond and Isle of Wight Counties showed approximately 15 areas of "Norfolk sand" which we had never known of, besides the famous one in southwestern Nansemond, our concentrated programme for July, August and September seemed ready made for us. We would use the proper scientific method and consistently visit them all at different seasons, there making the rich harvest of "Norfolk sand" (or pine-barren) specialties which, by the simplest of reasoning, must await us. So, when we started our next period (July 24–August 3), happy once again to be driven by Frank Birdsall, we promptly proceeded southeastward to Isle of Wight and Nansemond Counties. All the distinctive pine barrens known to us being adjacent to the Blackwater River and south of Zuni, the obvious course was to drive north from Zuni toward Raynor and other points near which "Norfolk sand" was indicated in several patches. But, alas, our faith in the Soil Survey, which in the past had received many jolts, was again to be blasted: every area, carefully located by means of the back roads and other features on the map, was now a prospering peanut-field, with no evidence that it had become so only since the

February preceding. Day after day we visited "Norfolk sand," always finding peanut-fields. The prosperous owners of these most productive fields did not realize that in Washington they are officially pronounced to be all "of second-growth forest" and "none . . . cultivated." And when Professor Massey joined us for a couple of days we gave him a vivid demonstration of the type of precision used in preparing the Soil Survey reports for these counties. Northwest of Holland (where there is a branch of the State Experiment Station) the map indicates an elongate patch of "Norfolk sand" with a farm-road bisecting it. Professor Massey was able to verify the farm-road, there running through the middle of a closely cultivated and productive field. Ho-hum! It was really not our fault that our perfectly logical programme had to be abandoned.¹

¹ We had been perplexed by the very simple mechanical methods indicated in the Soil Survey reports, by which the so-called different soils are often determined, a system based primarily on size and texture of soil-particles. We had also been puzzled to discover no indication of very acute knowledge of the native vegetation, beyond the ubiquitous species which characterize different soils. Such platitudinous phrases as "The vegetation bears a marked relationship to the soils" or "The undergrowth . . . consists of small holly and cedar trees, briers, and native grasses," with no indication of what grasses nor any indication of the occurrence in the acid pine barrens of the three trees (Catesby's Oak, Turkey-Oak and Long-leaf Pine) above noted, with "Juniper", *Chamaecyparis*, in the depressions. There is, furthermore, no recognition of the splendid calcicolous forests on the concentrated lime of the James River escarpment in northern Isle of Wight: Cottonwood, *Populus deltoides*, Hop-Hornbeam, *Ostrya*, northern Red Oak, *Quercus borealis* var. *maxima*, Chestnut Oak, *Q. montana*, Slippery Elm, *Ulmus fulva*, Florida Maple, *Acer floridanum*, various Basswoods, *Tilia heterophylla*, etc., with conspicuous undergrowth of *Hydrangea arborescens*, Moonseed, *Menispermum*, and Climbing Hydrangea, *Decumaria*.

To some extent the pregnant words of the great soil-chemist, Hilgard (whose most helpful understanding of relations of soils and crops as well as native vegetation was started in Mississippi and Louisiana) in 1908 are still important to remember. At that time, writing of a study which demonstrated the marked differences of vegetation on acid, calcareous and magnesian soils, Hilgard said:

"It is refreshing to find . . . a distinct departure from the hackneyed gathering-up of superficial observations on 'plant associations', without any mention of the probable, in many cases abundantly obvious, causes of the geographical grouping of plants. Ecological studies, as often made, savor strongly of the 'gedankenlose Heusammler' habit animadverted upon by Schleiden over half a century ago, and were apparently only temporarily stopped by Darwin's great work. The soil-conditions accompanying the occurrence of certain plant groupings are usually so superficially set forth that nothing but the old classification into hydrophytes, mesophytes and xerophytes is attempted; in conformity with a hypothesis based upon the arbitrary assumption that moisture is the only controlling factor of plant growth. Adding to this hypothesis the factor of soil-texture, and basing thereon the entire work of soil classification, Whitney and the Bureau of Soils of the United States have built up a one-sided theory, which is in flagrant contradiction to facts observable by any one not under the official afflatus of that head center."—E. W. HILGARD in *Science*, n. s. xxvii. no. 682: 140, 141 (Jan. 21, 1908).

Incidentally, the Bureau of Chemistry and Soils of the United States Department

After, with the collaboration of the federal government, we had wasted precious days and also precious money we had learned our expensive lesson. Disregarding the misleading but official guides to the natural soils, we returned to the old method of exploration, seeking and finding worth-while areas. During the futile search for those 15 patches of "Norfolk sand" which "At present support . . . second-growth forest," we had, naturally, picked up some interesting plants. Somewhat east of Cahoon Pond and north of Suffolk there is an extensive area of peanuts, exactly fitting the pattern and size of a patch of "Norfolk sand" and surrounded by forest, stretching down to Nansemond River. Here the border of the woods is heavily draped by a coarse, subliguous twining legume, in early August showing no flowers but in September loaded with great racemes of royal-purple flowers which scent the atmosphere for some distance away with a concentrated fragrance of Concord grapes. We first collected young branches, in September got flowering material, and in October the absurdly small and thin pilose legumes. The plant is Kudzu-vine, *Pueraria Thunbergiana* (Sieb. & Zucc.) Benth., an eastern Asiatic species often cultivated but here monopolizing the forest-border as a relic of its cultivation long ago, even before the Soil Survey was made. At another "Norfolk sand" station, where, Frank knowing the owner, we were granted permission to search where we would, we spent a most enjoyable hour at the margin of Western Branch (south of Reid's Ferry). To our delight the rare *Ammannia Koehnei*, var. *exauriculata* Fernald here abounded and here was the *Sabatia* of tidal shores, *S. dodecandra*, which we only rarely meet.

Reasoning that the shores of the Rappahannock toward the head of tide might yield some of the tidal-shore species which we knew farther south, we went toward Tappahannock. About noon, stopping to eat lunch in King and Queen County, somewhat north of St. Stephen's Church, we turned up a cart-road at the border of woods. While Long still lingered over tid-bits specially

of Agriculture, which put out the report on the *Soil Survey of Nansemond County, Virginia* (though "In cooperation with the Virginia Agricultural Experiment Station") would have done well to check on its geography. On the map accompanying this report most of Lake Drummond and a large portion of the Great Dismal Swamp, which on Virginia maps regularly appear in Norfolk County, are transferred to Nansemond County. An error of 2 miles of longitude is small, however, beside the other errors of fact above noted.

provided by his devoted housekeeper at home, I poked up the road until I was forced to decide whether to take the left or the right fork. I made a fortunate choice, for I promptly discovered a spring-fed sphagnous pocket in the woods and, after a cold drink, proceeded to untangle the mass of species, always of spring-fed sphagnous woods and always pretty local, including *Eleocharis tortilis* and *Carex Collinsii*. These were mingled with the most gigantic *Juncus subcaudatus* I had ever imagined, with inflorescences 10 inches long. I shouted to Long to come and help, and we soon found that, whenever we took hold of the abundant *Osmunda cinnamomea*, it stuck to our fingers. Search for ordinary *O. cinnamomea* failed to reveal it. The whole sphagnous wood was given over to the somewhat local var. *glandulosa*. We had never before met it in Virginia, nor have we seen it since. This was on one of the tiny rills flowing into Garnett Creek. At the crossing of another such rill near-by we tried our luck again. Here *Scirpus polyphyllus* abounded, the first we had ever seen in the tidewater counties. These sphagnous pockets between the low ridges which separate them will stand further work; but we had started for the Rappahannock and had to leave them for the future.

Aiming to try the shore of the Rappahannock at Ware's Wharf, we turned down-river toward Dunnsville. As we passed the big tidal marshes along Piscataway Creek we stopped to investigate. It was a sweltering day, especially in early afternoon, the marsh vegetation was rank and dense, as well as full of mosquitoes, and, although the spirit was not wholly unwilling the flesh was pretty weak. We decided to leave the Piscataway marshes until a cool day; not, however, before we had collected a good series of the *Polygonum sagittatum* there. It didn't look familiar and, later, when we found it also in the marshes of the Chickahominy, it became clear that these fresh tidal marshes support a tear-thumb which has much narrower leaves, the upper reduced to tiny bracts, and much longer and smoother upper internodes and peduncles than the usual plant. If we can only induce it wholly to abandon its scratchy character botanizing will become more pleasant! On the shore at Ware's Wharf, where, on account of the excessive heat, it was a temptation to lie in the shade of the Wharf, maritime species reach inland

limits on the Rappahannock, *Diplachne maritima*, *Eleocharis albida*, *Fimbristylis castanea* and *F. caroliniana* (Lam.) Fernald and *Sabatia stellaris* all abounding. And on the sand there were a few plants of *Portulaca grandiflora*, the first time we had ever met it growing wild.

Hearing in Suffolk that the water of Lake Drummond, in the center of the Great Dismal Swamp, was unusually low, so that patches of shore were exposed, we arranged by telephone with Capt. W. G. Crockett at Wallaceton to take us there in his motor-boat. The trip up the Feeder Ditch from Wallaceton to the federal dam which controls the level of Washington Canal, by letting in water from Lake Drummond when needed, is wonderfully picturesque, especially toward twilight when the dense bordering forest is vividly reflected in the quiet black water; and, once introduced to it and to Capt. Crockett's kindly good nature, rare knowledge of the plants and animals, and wonderful fund of unbelievable but plausible tales, the trip to Lake Drummond promptly became one of the pleasures regularly to anticipate. After being duly introduced to and registered by the engineers, especially Mr. Cherry, at the dam, Long and I walked up the path to the outlet, there to be met by Capt. Crockett. It was obviously too early for most lake-shore vegetation, but in the rich and dark woods, where it would be most simple to get turned around and lost, *Dryopteris celsa*, at its type locality, abounded; and the variations of *D. spinulosa* and its var. *intermedia* were super-abundant and hopelessly perplexing. Anyone, if he still exists, who imagines that these are distinct species should study the confluent series about Lake Drummond. It can be sorted only by counting the glands under a microscope and then the sorting is quite artificial. At the entrance to the Feeder and again near Portsmouth Ditch *Lachnanthes tinctoria* abounds, this being the only surely indigenous station for it in Virginia. The plants are larger than we were used to farther north, nearly three feet high and with corymbs up to six inches broad; and we imagined that the perianth was yellower, but study of a large series fails to reveal any significant differences. The recently described *Rhynchospora chalarocephala* Fernald & Gale in RHODORA, xlii. 426 (1940), for which only one station was definitely known in Virginia, abounds on the shores

of Lake Drummond, there particularly large and handsome; and we were here impressed by the very bristly sheaths of the *Sacciolepis*. Ordinarily *S. striata* is glabrous. The Lake Drummond plant proves to be *S. gibba* (Ell.) Nash, based upon *Panicum gibbum* of Elliott. It will be considered in Part II.

More than a century ago the erratic and too often irresponsible Rafinesque published as *Macuillamia obovata* a mixture of plants from Louisiana and from shores of the Potomac. His name, obviously based on a mixture and not identifiable by any specimens known to exist, had properly gone into the discard. But in 1935 Pennell, "leaning over backward" to do no possible injustice to the dubious memory of the author and to retrieve his name, took up *Macuillamia obovata* for a unique plant found by the late Earl J. Grimes on the shore of the Chickahominy (not on the Potomac) and, considering the species to belong in the not too inclusive *Bacopa*, I later stupidly (for I had not seen it) made the formal transfer of it, as *Bacopa obovata* (Raf.) Fernald. The only known material which had been referred to the Potomac half of Rafinesque's mixed *Macuillamia obovata* was a rather meagre series of 3 somewhat broken plants said by Pennell to have been collected by Grimes at Lanexa. Since, however, the label accompanying the specimens bears the name *Echinodorus tenellus*, belonging to a tiny acaulescent linear-leaved plant of the *Alismaceae* with umbels terminating naked scapes, a plant not known in Virginia, and since the Grimes specimens are clearly of a *Bacopa* (*Scrophulariaceae*), with rounded-obovate opposite leaves with axillary flowers borne along the ascending stems, there was obviously as much confusion about it as in Rafinesque's original publication. Repeatedly we had driven to Lanexa and there had crept along the tidal shores at every probable spot for a mile or more up- and down-river. The only *Bacopa* there is the smaller-leaved species forming prostrate mats, an undescribed and very characteristic inhabitant of the tidal shores of the Chickahominy and the Mattaponi, equally interesting as a new and localized species (PLATE 728) but surely not the Grimes plant. In view of the great abundance of the matted plant at Lanexa and generally along the Chickahominy for many miles, it is astounding that Grimes did not collect it. Still dissatisfied because of our failure to locate the rare species

which he presumably *had* collected somewhere and which had so obviously been associated with the wrong label, we decided to cruise in motor-boat along the Chickahominy from the head of tide, below Providence Forge, to the big curve of the river below Lanexa, a distance, as the river meanders, of more than 12 miles along each shore, making approximately 25 miles, besides the inlets, of tidal shore to be investigated. That was some proposition, for every bit of open shore exposed at low tide, at the entrances of seepage-rills or near landings, where the ubiquitous thicket of erect and dominating *Nuphar advena*, with its associates of the extensive marshes, had not obliterated everything else, must be investigated.

Returning to our friend, Mr. W. T. Walls, on the shore of the Chickahominy near Windsor Shades, we secured a boat with out-board motor. While Mr. Walls was getting everything ready for our start, we browsed along the marshy shore near his landing, promptly finding a mixed and not too quickly distinguished colony of *Lindernia dubia*, var. *inundata* Pennell and *Gratiola virginiana*, var. *aestuariorum* Pennell, the latter cited by its author only from Salisbury, Maryland, and from the Delaware in New Jersey. Circling about the islands in the river, we skirted the southern shore (in Charles City County) only a short distance, only to Cypress Bank Landing, for the collecting was very absorbing. The prostrate small-leaved and undescribed *Bacopa* made almost continuous carpets, more and more exposed as the tide went out; and from amongst these mats we quickly extracted *Peplis diandra* of the Mississippi Basin, discussed in the last paper on our Virginia work, *Potamogeton Spirillus*, its range extended into a new county, *Sagittaria Eatoni*, the problematic plant of tidal mud from the lower Merrimac to the Delaware, new to Virginia, *Cardamine Longii* of course, and *Micranthemum micranthemoides*, the first from south of the Potomac at Alexandria, and, inevitably, the very baffling series of tidal-flat *Najas*. The careful collecting of these muddy and silt- and alga-covered plants in a habitat where the water promptly became dark and opaque after each grab from the bottom, is time-consuming and back-breaking and, as stated, we barely reached Cypress Bank Landing on the first day.

It was necessary to return for low tide on two succeeding days,

not only for better material of some of these species but in order to reach Lanexa. The unusually dry cypress swamp at Cypress Bank Landing has some nice undergrowth but only two species there need detain us from the greatest prizes in late July along the Chickahominy. Here was *Styrax americana*, one of the rarest and most beautiful shrubs or small trees of Virginia, and the *Elymus virginicus* here was obviously var. *jejunus* (Ramaley) Bush, a distinct little extreme, not previously known in the Atlantic states from south of New Jersey. The greatest necessity to return to the Chickahominy, however, was the suddenly discovered problem in *Nuphar*. The broad and nearly impenetrable marginal marshes of the Chickahominy are an almost solid thicket of *Nuphar advena*, standing erect, and interspersed, where there is a root-hold, with *Zizania aquatica*, *Aeschynomene virginiana*, *Kosteletzkia virginica*, *Boltonia asteroides* var. *glastifolia* (Hill) Fernald, either white or pink, and other tall species which can stand the crowding. When we left the immediate tidal shore of the Chickahominy we found ourselves in a maze of *Nuphar*, with floating leaves much narrower than the erect ones of *N. advena*, the plants bearing beautiful masses of filmy submersed foliage. In mid-current the narrow and elongate leaves were obviously those of the famously localized *N. sagittifolium* (PLATE 718), reputed to grow only in the Lower Cape Fear river and adjacent tidal rivers of southeastern North Carolina and northeastern South Carolina. That much was clear; the familiar "first known from north of southeastern North Carolina" applied even to the mid-current *Nuphar* of the Chickahominy. Our difficulty was with the floating-leaved plant (PLATE 719) which everywhere formed a broad belt between the mid-stream *N. sagittifolium* and the open-marsh *N. advena*. This plant, with floating and submersed leaves broader than in the former, with the "floaters" much narrower than in the latter, which is supposed not to have filmy submersed blades, abounded for many miles down-stream as well as up some of the entering creeks. Repeated study of it in the field and subsequent study in the herbarium indicate that it is a well defined hybrid-species, comparable with the northern *N. rubrodiscum*, which is often associated with its very distinct parents, *N. microphyllum* and *N. variegatum*. Even though we had not yet found Grimes's

problematic *Bacopa*, the Chickahominy had more than justified our visits to it.

Grimes had reported *Sarracenia purpurea* from "Swampy woods, at Chisel's Run, near Williamsburg-Centerville Road"; and since *Sarracenia* is an index-species to a habitat where interesting associates may occur, we sought out Chisel's Run. Where it crosses the road it was, at this season, dried out and we could not locate the *Sarracenia*. The plant which immediately challenged our attention was, instead, a rather small *Nuphar*, with roundish, erect leaves and with the fruiting peduncles arched into the mud. This plant somewhat baffled us and, starting early next day, we crossed and recrossed Chisel's Run at several places, locating new colonies of the *Nuphar*, always small-leaved and erect, until finally, just east of Centerville, a small and very muddy pondhole proved to be its real home. At the margin of the pond the leaves were erect and rather large, inseparable from those of *N. advena* of the tidal marshes; but farther out, in deeper water, the firm blades were floating. Best of all, young plants in deep water had filmy basal foliage, in shape like the emersed leaves. The flowers and fruits are those of *N. advena* and it was evident that, in this quiet and hardly fluctuating water, we were getting the submersed foliage of that species (PLATE 717), which in estuaries does not produce them.

Having a few hours left, we decided to investigate flat Mulberry Island, a great and almost contourless expanse on the north side of the James, with many tidal creeks. Passing Lee Hall and approaching the "Old Earthwords" of the map, we found ourselves at Fort Eustis, a very much alive military post. It proved that Mulberry Island was in use throughout the week for bombing-practice and would be a most unhealthy place for botanists. Incidentally, we could visit it only on a Sunday and then by special permit. In view of the intensified activity since December of 1941 Mulberry Island will remain a botanical *terra* (if not *terror*) *incognita* for some time to come. Attracted by the crowded contours and steep slopes to the James west of Carter's Grove and southeast of Grove Station, we started for Grove Landing and adjacent Martin's Beach. Very soon we were in the richest of hardwood forest, growing on the Miocene fossil beds of calcareous marl and shells. Collecting as rapidly

as possible, for it was becoming late, we were promptly impressed by the *Hypericum punctatum*, for here, instead of oblong and round-based leaves, it had them narrowly oblanceolate or spatulate. We had noticed it before but here it abounded, the extreme form which Bicknell had separated as *H. subpetiolatum*. In the woods *Taenidia integerrima* abounded, an inland and upland calcicolous species not seen by Grimes and never before found by us on the Coastal Plain. Similarly, *Triosteum perfoliatum* was new to our Coastal Plain experience. The forest from well back in the ravines to the bases of the bluffs was very striking with the whitish-gray trunks of *Acer floridanum* (Chapm.) Pax (PLATE 725).

It was evident that another half-day was needed for such a rich locality. So, returning next day, we at once became involved with *Acer*. Three series of trees abounded, some past fruiting, others in full fruit, and the late-fruiting trees differed from the others in many characters. We collected from a dozen different trees and when, in April of this year, we returned with my two former students, Dr. Ernst C. Abbe of the University of Minnesota and Dr. Albert L. Delisle of William and Mary, we got a fine series of flowering specimens, these later supplemented by fruiting material kindly gathered for me by Delisle. In brief, there are three quite distinct series of *Acer* and some evident transitions between them on the calcareous slopes near Grove Landing. One is a relatively small tree with smooth but finally furrowed whitish bark, the trunks up to 2½ feet in diameter. This tree has slender and glabrous or usually glabrous new branchlets; tiny flowers, the pistillate or perfect ones with the short style included; the small leaves, in size and form suggesting those of *A. campestre*, pale and minutely tomentulose-pilose on the veins beneath or glabrate; the small fruits promptly falling (often all dropped in June). This is an exact match for *A. floridanum* (Chapm.) Pax, a species (PLATE 725, FIGS. 1 and 2) already well known to extend into southeastern Virginia. The others in good development are very different: magnificent trees (PLATES 726 and 727, FIGS. 1 and 2) with whitish trunks up to 4 feet or more in diameter, the old bark exfoliating in long shingles, so that old trunks suggest shag-bark hickory; the flowers larger than those of *A. floridanum*, the styles long-

exserted; the leaves as large as in the northern and upland *A. saccharum*, of two quite distinct forms, both deeply lobed and, like the young branchlets and petioles, heavily covered beneath with a dense whitish to brown felt or velvet; the fruits larger than in *A. floridanum*. Although a few trees are evident transitions between the two extremes, the shag-barked maples are certainly not typical *A. floridanum*. Neither are they the shrubby or barely arborescent and more southern *A. leucoderme* Small, the only other eastern white-barked species. They seem to stand to *A. floridanum* in much the relation of var. *nigrum* to *A. saccharum*; they will be further discussed and illustrated (PLATE 726 and 727, FIGS. 1 and 2) in Part II, where I shall take great satisfaction in permanently associating with them the name of my companion, Long, who has done so much to discover the rarer plants of southeastern Virginia.

A couple of remarkable and heretofore undescribed "Sugartrees" would have been a fitting climax to a trip which began as an absolute "flop"; but we had to get back to the Meherrin, near Gaskins in Greensville County, for mature material of the puzzling *Stachys* which abounds on the wooded bottomland there. Consequently, we devoted our last day, before returning home, to the Meherrin. Starting on the farm-road toward the river, we soon got out and walked, for many interesting species demanded attention. The beautiful pink-flowered *Sabatia* was real *S. companulata* var. *gracilis*, the first satisfactory material we had seen in the state, earlier collections being too transitional to *S. campanulata*. A single plant of a *Crotalaria* excited us, for it was like oblong-leaved material we had once got on the Eastern Shore, about the identity of which we had never been happy. It proves to be *C. sagittalis* var. *oblonga*, described by Michaux in 1803 and not subsequently recognized, a plant represented in the Gray Herbarium by no other material from north of Florida. The border of a cultivated field gave us one fine species which we had never before seen in the state, the handsome *Cassia Tora*, a splendid tropical plant. Thus, our last day out was far more productive than the wasted first days and, having got into real stride, we regretted having to quit while discoveries, some of them of tremendous interest, were the daily reward for our effort.

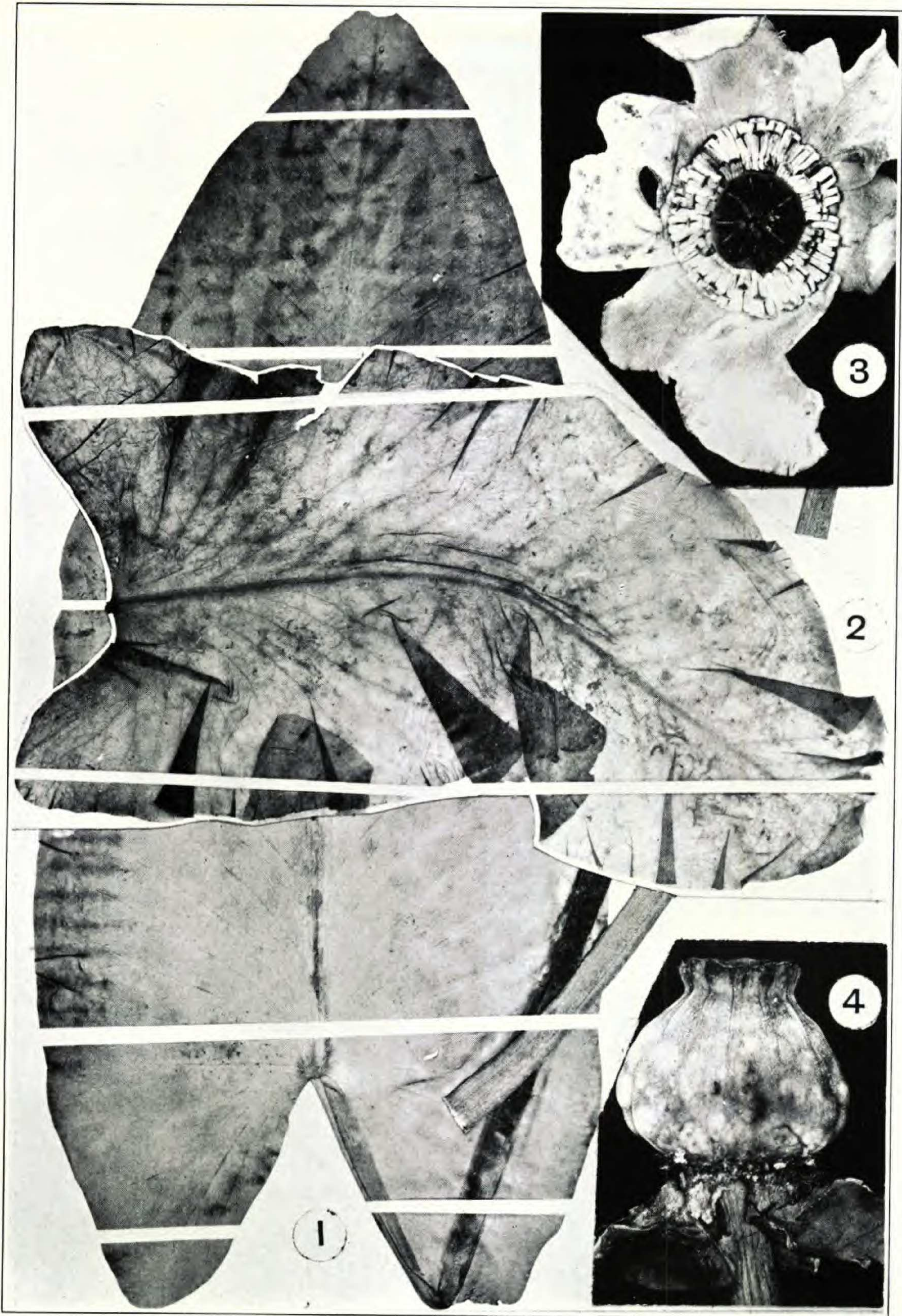


Photo. B. G. Schubert.

× NUPHAR INTERFLUITANS: FIG. 1, floating leaf; FIG. 2, submersed leaf; FIG. 3, flower, laid open; FIG. 4, fruit; all × 1.



Photo. B. G. Schubert.

ACONITUM UNCINATUM, FIG. 1; var. ACUTIDENS. FIGS. 2-4; all $\times 1$.

When we returned in September (5–15) Frank's school was beginning, our other fine drivers and companions of the past were all away or in military service and, except for those happy days when Orion Birdsall could take a day off to go with us, we were at the mercy of as poor a substitute as could be imagined. Our regular or, rather, irregular driver was so irresponsible and unreliable that we never knew, until he arrived, whether we should get away for a full day's trip. Thus handicapped, the inevitable result of having all high-grade young men in the government service or at other important employments, we actually made a good score of discoveries, because we were in a region of seemingly endless possibilities, even under adverse conditions. Returning to the James River escarpment in northern Isle of Wight County, we found below Fort Boykin a patch of very large plants of *Physalis barbadensis* Jacq., a tropical American species we had not before encountered; but the strangest plant for its habitat here was about the hydraulic ram which pumped water for a hotel. The overflow from the pump made a perpetually replenished pool in the woods and in this pool, under heavy splashing of cold, fresh (probably calcareous) water, *Zannichellia palustris* var. *major* abounded, a plant more generally found in quiet, brackish to saline waters.

Returning to the steep marly bluffs above old Fort Boykin, we found the cultivated field, by which we passed in approaching the river, with one conspicuous weed, a villous-hirsute Malvaceous plant with somewhat angulate-lobed leaves, flowers with blue-violet petals shorter than the calyx-lobes, and radiating, long-awned carpels. It was wholly strange to us and not in Small's *Manual*. Search shows it to be a puzzling member of the tropical and subtropical genus *Anoda*. I can not exactly match the plant, which belongs to the polymorphic series of Texas, Mexico and South America and all called, until the genus is properly monographed, *A. cristata* (L.) Schlecht. In fields along the James it is pretty far from home, assuming that it can be matched and has a home. Then, in following the path down the wooded slope to the river-beach, we got the large-leaved *Satureja Calamintha* (L.) Scheele, var. *nepetoides* (Jordan) Briquet, a well marked variation of the common *S. Calamintha* (*S. Nepeta*) and not heretofore recorded from America. How these two

weeds, the first apparently from South America, the second European, got into this corner, remote from railroads and much outside intercourse, is a problem, one which suggests the question of the local origin of the commonest representative of *Chenopodium ambrosioides* in southeastern Virginia, a villous, instead of glabrous, plant abounding in waste land, which proves to be the South American var. *chilense* (Schrad.) Spegaz., to be discussed in Part II. To this group of South American weeds, naturalized in southeastern Virginia (in this case also in eastern North Carolina), belongs "Muster. John Henry", *Tagetes minuta* L., noted in RHODORA, xxxix. 459 (1937). That, however, is raised in many yards of the colored population as an aromatic herb.

The native plants of the marly bluffs have already been sufficiently noted, but on the beach of the James *Gaura biennis* reaches its probable eastern limit in the state, and here we found a single individual of *Cuphea petiolata*, obviously a waif from some station we do not yet know. One plant of the bluffs, however, should be specially noted, *Campanula americana* with the flowers all tubular and cleistogamous. Typically *C. americana* has the corolla rotate and deeply cleft into prolonged lobes; and upon these characters has been set up the *micro* (Small)-genus *Campanulastrum* Small. The aberrant plant with the corolla more tubular than in most true *Campanula* seriously shakes one's faith, if he has any, in the generic stability of *Campanulastrum*.

Earlier in the year we had seen a strange prostrate *Desmodium* in rich calcareous hard woods west of Chippokes. It now seemed the right season for it to be fruiting; and it surely was fruiting, the loment quite strange to us. Only two or three lingering flowers could be secured, these milk-white; but these belong, Dr. Schubert assures me, to the very rare *D. ochroleucum*. In RHODORA, xli. 546 (1939) I recorded the latter species from a wholly different habitat, dry and hopelessly sterile siliceous and acid woodland of *Pinus virginiana* in Caroline County, where Long and I could have collected many thousands of sheets. That plant had the petals cream-colored, quickly changing to yellow, and, although we then called it *D. ochroleucum*, Dr. Schubert shows me that in stipules and other characters it surely is not that species.

The calcareous woods and ravines sloping to the James below Claremont Wharf and, some miles away, above Claremont have yielded so many choice or rare species that we decided to try the shores and slopes immediately above the Wharf. We had looked there earlier in the season and when we went there in September we were happy to have Massey with us. The great series of calcicolous woodland species already recorded from the Claremont region need not be again enumerated, but some now found were new to us. Turning into an old station in order to show Massey our colonies there of *Hybanthus concolor*, *Athyrium thelypteroides*, *Dryopteris celsa*, etc., we walked into a fine colony of *Scrophularia marilandica*, new to the Surry County list. On the beach a clump of *Aster pilosus* Willd., var. *demotus* Blake held its old involucre of the preceding year and its new flowering branches arose from the axils of the preceding autumn. The herbaceous genus *Aster* is difficult enough; if it is to enter the group of shrubs we may be able to turn it over to those who somehow still think that trees and shrubs are taxonomically the property of specialists who never look at herbs. In the woods and thickets back of the beach and in wooded ravines *Eupatorium rugosum* Houtt. (*E. urticaefolium*) did not look right. Its leaves were rather small, harshly scabrous and often cordate and the involucre of the few flowering heads did not seem typical. It was promptly noted for observation a month later.

While Massey was with us we had no difficulty in inducing him to make the trip to Lake Drummond. We had already been to the Lake a week or so earlier but there were many strips of shore still awaiting attention. The two visits, chronologically so near together, may be treated as one. To us it was very sad to see much of the eastern half of the Great Dismal Swamp still smouldering and smoking. Whenever we had been there fire was working unchecked and, it seemed to us, so taken for granted that the destruction of forest and originally deep humus goes on as a matter of course. When, in April of this year, Capt. Crockett took us, with Dr. Abbe, in to Lake Drummond fire still burned, without evident protest, close to the government Feeder Ditch. Nearly 70 years ago the late J. W. Chickering wrote of the region of the Great Dismal Swamp reached from Norfolk, "Most of the large trees . . . have fallen victim to the

frequent fires, several of which were raging during our visit, and lighted up the horizon at night; often by these fires the peaty soil for miles is burned to the depth of four or five feet; the hollow thus formed soon fills with water, and ever after retains a truly 'dismal' appearance."¹ That was 69 years ago. We gather from the newspapers and journals that we have advanced in our appreciation of our natural resources; it makes pleasant reading but if anyone, civilian or official, makes any serious effort to save from complete and wasteful ruin some remnant of the great forest and the deep soil of the eastern half of this unique, sentimentally significant, and economically once important area, we have not noticed it. The Feeder Ditch, tributary to the federal Washington Canal, is under government management. While the great feeder-dam is scrupulously maintained, guarded by military police, and its water conserved, the forest near-by is being wasted and laid bare. For that no one seems to "give a dam[n]". Yet we sometimes hear of so-called "conservation," which in this country often means killing out the rare native plants and then planting foreign crops to attract game-birds, in order that "conserving" man may destroy them. What a farce! When all the old trees and all the humus are burned out and the resultant ash has become covered with a rank growth of weeds, the Great Dismal Swamp will be a candidate for "preservation" as a National Forest.

But the living remnant of the original flora still has some interesting species. It was good to collect fine material of *Psilocarya scirpoides* var. *Grimesii* Fernald & Griscom at its type-station, where Grimes had got it 20 years before, and to verify the reported occurrence of *Eriophorum virginicum* in the Dismal Swamp. Grimes and, before him, the late J. Arthur Harris had got *Xyris fimbriata*, not recorded from the state, in some abundance; the best Long and I could do on our first trip of the month was to find a solitary individual among the superabundant *X. caroliniana* and *X. difformis*. Typical *Rhynchospora macrostachya*, at its only known locality in the state,

¹ J. W. CHICKERING, *The Flora of the Dismal Swamp*, Am. Nat. vii, 521-524 (1873). Unfortunately it is not possible for those who know the region to accept some of Prof. Chickering's identifications. His statement that "The great laurel (*Rhododendron maximum*), and perhaps loblolly bay (*Gordonia Lasianthus*), are very abundant" should have had all the emphasis on "perhaps" or rather *probably not*; and surely there was serious error in recording *Myrica Gale*.

mingled with *Lachnanthes* and *R. chalarocephala*; and on one stretch of shore, near Jericho Ditch, *Sagittaria Engelmanniana* (the broad-leaved forma *dilatata*) abounded. Although not definitely reported from south of Delaware it is, on Lake Drummond, really at an intermediate station, for, as noted in Part II, it has been collected as far south as South Carolina.

Lake Drummond was so phenomenally low that it had been difficult to navigate, on account of drowned cypress-knees, and it was, consequently, necessary to anchor hundreds of yards from the thicket and to wade, often slipping on submerged logs, to shore. At one point on the southeastern side, where we saw a vivid green carpet of low vegetation, Long and I struggled ashore, guiding ourselves by means of oars as sounding-rods and sinking each step well above our knees into the plastic clay of the bottom. Even after we got to the green carpet the clay, above low-water level, was so pasty and deep that we wallowed and tumbled with great ease but kept enough poise and breath to collect only with extreme difficulty. Pulling and grabbing as best we could we brought back to the boat a miscellany of specimens and, after it was too late, we discovered that the *Sagittaria* of this deep mud had peculiar bracts and strongly compressed pedicels; furthermore it evidently has prolonged subterranean rhizomes. The material is rather inadequate and we needed more conclusive specimens. Unfortunately, however, when, in October, we tried to get to Lake Drummond for it, the Feeder was closed to navigation on account of repairs going on. The *Sagittaria* is one of many problems left for the future.

On seeping shores near Jericho Ditch and in the Ditch itself *Limnobium Spongia* abounds, sterile and very large in the Ditch, fertile, freely flowering and fruiting on the shore. We always turn in at Jericho Ditch for a drink of cold water. Fed by subterranean springs, Lake Drummond supplies potable water the color of strong tea ("Juniper water"), though after a hot summer pretty warm, but Jericho Ditch has delightfully cold water. We were glad, as we had never been before, to drink freely from a "ditch." Near here the woods yielded *Ilex coriacea*, known to Capt. Crockett as Sweet Gallberry, the fruits, becoming soft and pulpy in autumn, said by him to be palatable, as contrasted with the hard and persistent ones of Bitter Gallberry, *Ilex glabra*.

And at the western side of the Lake, in Nansemond County, we wandered in an extensive forest of large trees of *Persea palustris*, loaded with such masses of bluish-black fruit as we had never imagined, some trees with the prescribed pubescent foliage, others but sterile ones with the leaves glabrous. We already knew the glabrous-leaved form from other areas in the county. It seems not to have been described, for botanists of the past have evidently mistaken it for the quite different glabrous-leaved *P. Borbonia*. *Persea* is primarily tropical, formerly extending northward on the Coastal Plain only locally to southern Delaware. It was, therefore, a bit disconcerting to walk under its shade through abundant *Dryopteris spinulosa*, inseparable, so far as we could see, from the fern of Canadian and European forests. What sort of ecological "association" is this?

Eupatorium was developing, far enough along for recognition. One species, however, was not recognized in the field by us. We had already got it in thickets near Wallaceton, and on the shore of Lake Drummond it abounded. It proves to be *E. recurvans* Small, the first from north of Georgia. Another, a plant we had often collected, had jagged-toothed leaves. It belongs in the polymorphic series typified by *E. hyssopifolium*. We had been perplexedly collecting these plants since we first went to Virginia. In Part II I shall try to elucidate them, including two varieties (PLATE 737) not previously recognized from Virginia and a new species (PLATE 738), apparently endemic. Lake Drummond had well repaid our two visits. Outside, north of Wallaceton, we stopped on our second visit for more mature material of a *Bidens*, unlike any we had recognized in the state, but still needing mature fruit for its identification.

Returning from Norfolk County, we noticed that the broad bottomlands of the Blackwater, usually drowned, were dry enough for easy traveling. So we spent a very exceptional hour on the bottoms southeast of Ivor. The great prize was an extensive colony of *Cynoctonum Mitreola*, in aspect very like a Borage with white flowers, but promptly distinguished by its opposite and stipulate leaves and by the fruit. Other bottomlands, too, gave us some nice things. Returning to the Nottoway east of Huske we found our tangle of *Vitis Baileyana* in ripe fruit, the grapes blue with a bloom and pleasantly sweet.

V. vulpina (*V. cordifolia*), which it slightly resembles, would not be ripe for some weeks yet and no one would eat its black fruit for sweetness or for pleasure. On the bottomland of the Nottoway near Green Church Bridge we were delighted to find an extensive area of *Erianthus brevibarbis*, a rare species for which we had only one previous station, that in constant danger of extinction. Similarly, on the bottomland of Three Creek at Drewryville, where we always find something worth while, *Micranthemum umbrosum* (Walt.) Blake, which we had found there as immature plants in 1936, was now finely flowering, the broad, creeping mats suggesting tiny *Lysimachia Nummularia*; and with it were fine colonies of *Paspalum fluitans* (Ell.) Kunth, a species for which our stations are few. In the depressions where water stood the *Diodia* puzzled us. It proves to be an undescribed and quite characteristic extreme of *D. virginiana* with distinctive characters in both leaves and fruit.

While collecting beautifully flowering and very tall plants at the border of dry woods near Orion of the recently described *Sida inflexa* Fernald, new to Greensville County, we were impressed by the firm and strongly scabrous foliage of *Phaseolus polystachios*, growing with it. It had more than once so impressed us in past seasons, the leaflets relatively stiff, harsh and withstanding heat, whereas the plant of Pennsylvania, New Jersey, New York and southern New England wilts upon being picked and its thin leaflets are smooth above. In October, when we got it in fine fruit, it was clear that the beans differed in shape, size and color from those of the more northern plant.

Earlier in the summer we had seen at the border of woods in Adams Swamp, south of Baines Hill School in Nansemond County, an exceedingly villous and leafy *Elephantopus* which puzzled us. It was now time to go for mature material. The plant proves to be a marked extreme of *E. carolinianus*, one we have seen nowhere else.¹ In wet woods in the swamp there

¹ We thus added another to the Virginian series of Elephants and their feet. We already had the Bare-footed Elephant (*Elephantopus nudatus*), the Hairy-toed Elephant (*E. tomentosus*), the Stub-toed Hairy-toed Elephant (*E. tomentosus*, forma *rotundatus*), the Carolina Elephant's-foot (*E. carolinianus*). We were adding the Woolly-socked Carolina Elephant's-foot! These names, like "Foul-scented Love-grass" and others in Britton and Brown and many of the crudely formed absurdities in the new "Standardized" Plant Names, are not colloquially used. Ours are intended as jokes; the others, unfortunately, were not. It is often said, however, that the greatest jokes are unintentional.

were extensive areas given over to the long-arching and often tip-rooting, very soft-hairy *Ludwigia pilosa* Walt., which we had known only once before in Virginia, in mossy pineland south of Grassfield in Norfolk County. There the plants are low and rather small. Here they were tremendous, and their creeping basal offshoots were prolonged. On the way back to Suffolk from Adams Swamp we suddenly saw in the roadside ditch bordering low woods a *Coreopsis* with much broader basal leaves and much shorter ligules than in the frequent *C. oniscicarpa* Fernald. Its involucre also showed marked differences and it was evident that we were adding another *Coreopsis* to the flora of the state. It would be necessary to return in October for fruit.

September visits to the tidal shores of the Chickahominy yielded more adequate material of *Micranthemum micranthemoides*, *Sagittaria Eatoni*, the carpet-forming *Bacopa* and, of course, *Nuphar*. *Hypericum mutilum* var. *latisepalum* Fernald, which we had known north of Florida only on tidal shores of the Mattaponi and the Pamunkey, was abundant; and a slender *Strophostyles*, somewhat like *S. umbellata* but quite glabrous, abounded in the wettest of tidal marsh. Fruit secured in October shows it to be an estuarine variety of that species of dry soils. Best of all, we finally got the mysterious *Bacopa* (PLATE 729) about which Grimes's reputed label is so contradictory. Only three poor pieces of it have previously been known, their true source wholly vague, and their identity evidently misinterpreted. We now have a good series which forms the type of a second species of the genus to be described and illustrated (PLATE 729) in Part II.

No trip to southeastern Virginia could be made under happier circumstances than our next brief visit (October 10-17), for we had delightful weather, the red-bugs were gone, frosts had been delayed, except in the Dismal Swamp and other extensive low areas, and, best of all, Dr. Donovan Correll, at home in North Carolina for his vacation, readily accepted our invitation to drive us to old and to several new stations. Our only regret was that Mrs. Correll, whose acuteness as a field-botanist we well knew, could not be with us. Time was short and we wanted to get at many areas, the Rappahannock at the north, the Carolina border at the south. I had written from Cambridge, arranging with Capt. Crockett to take us back to the pasty-clay

shore of Lake Drummond for the perplexing *Sagittaria*. Unfortunately, however, when we reached Wallaceston the Feeder Ditch had been temporarily closed to navigation. We, consequently, started for Northwest River to the eastward. Coming to a wooded swamp near Gertie, which seemed attractive, we stopped to look it over. The only real novelty, however, was an abundant small oak in the dry woods above the swamp, with the lower leaves of the branches like those of *Quercus Phellos*, the terminal ones broadened from prolonged wedge-shaped bases to deeply 3-lobed obovate summits. This proves to be the very rare *Q. nigra*, var. *tridentifera* Sargent. We incline to the interpretation that its rarity is due to its probably being a hybrid of *Q. nigra* and *Q. Phellos*.

Aiming to cross the upper Northwest River by the bridges shown on the old map, we succeeded in finding our way to one bridge and on the broad bottomland southeast of Cornland found *Panicum hemitomon*, a local species in Virginia, very luxuriant. Then we got lost but eventually brought up at Northwest. One plant, detected on the way, is well worth a note. On the second day in this region, after passing Cedarville and driving toward Land of Promise, we saw a tall and loosely ascending *Aster* with very long and slender spiciform racemes of tiny lavender-rayed heads, somewhat suggesting *A. vimineus* but too stiff and scabrous and with the phyllaries inclined to be subulate-tipped. It proves to be the rare *A. racemosus* Ell., heretofore known only from Florida to eastern Texas, north into extreme southeastern South Carolina. We always expected something from the neighborhood of Land of Promise; now we were getting it.

The first afternoon at Northwest we spent chiefly on the reed-marsh near the bridge, where the tide is sufficient regularly to change the water-level. This was an old locality of Heller and of Kearney. We consequently got little which they have not recorded. These marshes are the type-locality of the superb *Lobelia elongata* Small, with large azure-blue flowers in racemes up to a foot long, and we were glad to secure good specimens, some of them strongly forking. *Cladium mariscoides*, apparently not recorded from the state, abounds, as does *Rhynchospora macrostachya* var. *colpophila* Fernald & Gale, the estuarine ex-

treme which we had not seen from south of the James. The blunt- and small-leaved *Lyonia ligustrina* var. *foliosiflora* also abounded, the true southern shrub of such habitats, new to Virginia, the acute-leaved and usually taller Virginian shrub which has erroneously passed for it being var. *salicifolia* (Wats.) DC., as pointed out by me in RHODORA, xliii. 625 (1941). A sphagnous pocket gave us *Eriocaulon decangulare*, *Sabatia dodecandra* and some other species which, with them, were recorded by Kearney or by Heller. Seeing a corduroy road through the woods of the bottomland, we followed that. We vainly looked for fancy southern shrubs but everything at this season seemed familiar, although it is a promising habitat for something new to us. The most striking plants, perhaps, were two: *Limnobia Spongia* in solid carpets and the now quite familiar *Rhynchospora caduca* Ell., here just coming into flower in mid-October, doubtless because the woods had only recently emerged from continuous flooding.

Moving on to Blackwater River (tributary to the North Landing River), Long and I were fighting our way through *Typha truxillensis* HBK. and other towering plants of the reed-marsh there with our hands full of very tall *Ludwigia alata*, from its second station in the state, when Correll called, "What is this *Aster*?" We had seen no *Aster* but very soon we were in a large colony of a coarse and rather handsome species strange to us, with subcylindric, broad inflorescences of large flesh-pink heads. It proves to be the rare southeastern *A. Elliottii* Torr. & Gray, new to Virginia—so rare that, until our material was inserted, there were scarcely six sheets in the Gray Herbarium of this species, described more than a century ago.

During our earlier seasons, when we had our base at Virginia Beach, Long and I had several times followed the overgrown and greatly obstructed Pungo Causeway, an old highway leading from below Land of Promise to the likewise forsaken Pungo Ferry. At that period we were able to get only to the drowned border of the reed-marshes of North Landing River, just where the tropical Saw Grass, *Cladium jamaicense*, appears and where the northern Cranberry, *Vaccinium macrocarpon*, forms a carpet under this coarse and unpleasant sedge. Now things have changed. Pungo Ferry, originally crossing the North Landing

River, part of the federal Albemarle and Chesapeake Canal, but long abandoned, has been revived, and Pungo Causeway is now a surfaced road. When we drove in past the masses of *Smilax Walteri* and *S. laurifolia* which festoon the roadside and were now in full fruit, we suddenly saw many acres of *Eriophorum virginicum*. This and Cranberry indicated northern sphagnous conditions, but, alas, progress is most difficult in this area, every step a struggle through a mesh of tough and fierce *Smilax laurifolia*, like an unending chain of caltrops, and every misstep landing one either in its embrace or amongst the sharp and crowded, hard teeth of Saw Grass. Long and Correll braved these impediments to get grasshoppers and mosses, but I was content to dig out from the sphagnous knolls over-ripe material of *Rhynchospora alba*, another northern (circumboreal) species here at a remote southern limit.

While in this corner of the state we called in, at twilight, to get fruit of the *Bidens* north of Wallaceton. Its achenes were ripe (in fact the plants were heavily frosted). It proves, as we had expected, to be the characteristic Cape Cod *B. coronata* var. *brachyodonta* Fernald. The mingling of northern and extreme southern plants in the swamps of this region was again emphasized. We also drove toward Baines Hill School for fruit of the new *Coreopsis*. This, fortunately, was now quite ripe and it quickly settled the relationship of the new plant. Slightly to the east of Suffolk, perhaps nearer Magnolia, we saw a strange inflorescence. It proved to be a tall virgate panicle of a *Chrysopsis*, such as we had never before found; and since the members of the *graminifolia*-series of that genus had perpetually given us puzzles, I have taken this new one as a starting-point for a study of the series in Virginia and the Carolinas. This, including two new species and two new varieties, with four plates (741-744) will be found in Part II.

Returning to Claremont for the strange variety of *Eupatorium rugosum*, we got a full series in lingering flower and in fruit; and the character of the involucre which we had noted in September (the oblong phyllaries green and herbaceous, instead of linear and scarious), accompanying the small and scabrous leaves, indicated a local variety (PLATE 739) of that wide-ranging species. Farther down the James, along Burwell's Bay, below

Rushmere, we had formerly collected a gigantic extreme of *Strophostyles helvola*, with the leaflets broadly ovate and obtuse, not inclined to be fiddle-shaped and short-acuminate as in typical *S. helvola*, and twice as large as in the latter. Its flowers were also larger. Now, in mid-October, the fruit was ripe, the long legumes bearing beans up to 12 mm. long. It proves to be var. *missouriensis*, not recorded from Virginia.

Wishing to try the Rappahannock again, we proceeded to Port Royal, but, the shore there being not very available in limited time, we contented ourselves with *Rhynchospora macrostachya* var. *colpophila* and then drove farther down-river in Caroline County, finally taking a farm-road from near Return to the river-margin. The old place on the river, now owned by Mr. and Mrs. Snowden, is very interesting. Mr. Snowden, a retired teacher, and his alert wife fully value the traditions of the old plantation and we were inclined, as they showed us portions of the buildings and many Indian relics dug up on the grounds, to forget that we had come to look at the shore. Here was *Ericocaulon Parkeri*, our first from this river; but we soon became absorbed in the masses of trees and shrubs on the bank and back of the beach. Everything cultivated on the old plantation had evidently run wild and multiplied on the steep bank. Many familiar cultivated shrubs and trees there abound, and the shrubby *Vinca major* L., with branches 6 feet long, made a wonderful dark-leaved thicket. It is unnecessary here to make a catalogue of old garden plants, but the most notable of the naturalizations was Kentucky Coffee Tree, *Gymnocladus dioica*, here at home and heavily (in both senses) fruiting. A few miles to the southeast, we turned in near Loretto in Essex County and came to another stretch of shore, there establishing Rappahannock stations for *Isoetes saccharata*, *Aneilema Keisak* Hassk. and some other tidal-marsh species. *Hypericum prolificum* abounded and, in the woods, *Poncirus trifoliata* (L.) Raf. was loaded with fruit. We had been amazed when, some years ago, we found this small Asiatic orange slightly naturalized near Claremont on the James. On the Rappahannock it is 60 miles farther north.

Planning to make a last trip of the season to productive stations in Greensville County, we decided that, instead of following the usual roads from below Petersburg into the city, there picking

up the route to Emporia, we would go south on U. S. Route 1 and pick up a cross-road to the Emporia route. The road from McKenney, 15 or 20 miles back in the Piedmont, straight across to Stony Creek at the inner border of the Coastal Plain, was one we had never taken; that seemed the proper choice and it would get us promptly to Stony Creek, thence to Emporia. We somehow never learn that, if we want promptly to reach a distant point, it is unwise to take an unfamiliar road! Promptly when we swung from Route 1 at McKenney into the Stony Creek road, I called a halt. At the border of the woods I saw too many Coastal Plain plants. A couple of hours in flat pineland, a characteristic Coastal Plain habitat, revealed that, back here in supposed Piedmont country, there is a tongue of typical Coastal Plain deposits and vegetation, an evident arm or inlet of the Miocene sea. *Helianthus angustifolius*, *Cirsium virginianum* and *Solidago perlonga* Fernald were conspicuous and dominant, all belonging chiefly to the rockless area to the east, and soon we were collecting *Gentiana cherokeensis* (W. P. Lemmon) Fernald, the species of northwestern Georgia which had its only known additional station in the flat pineland east of Stony Creek. Then Correll brought in characteristic material of *Hypericum denticulatum* Walt., a species we had known in eastern Virginia only from a single small station in Greensville County. It was late in the season, consequently most species were now unrecognizable but sharing the thicket with *Chionanthus*, as abundant as we have ever seen it, was a shrub quite new to the Coastal Plain list, the inland *Viburnum Rafinesquianum* Schultes. Furthermore, here was the same puzzling *Muhlenbergia* which in late August of 1938 had perplexed us in Assamoosick Swamp and, again, in October of that year had seemed both strange and familiar to us in the flat pinelands, with *Gentiana cherokeensis*, east of Stony Creek. Turning up now with the same associates in the flat pineland near McKenney, it has more than piqued our curiosity; and well it might, for it proves to be the very characteristic *M. brachyphylla* Bush, heretofore known in low woods and prairies from Texas to Nebraska, Iowa, Illinois and Indiana. Obviously the flat pineland just east of McKenney needs attention through the season.

Driving slowly now, for the immediate problem was the

important one, we noted many spots for future exploration and shortly before leaving Dinwiddie County we were attracted to a wet depression in the woods. It was a typical bit of Coastal Plain, mossy and wet and given over largely to the local *Rhynchospora cephalantha* Gray, *Xyris platylepis* and other characteristic and local species of the Coastal Plain; and bordering the swamp there were as handsome and profusely fruiting shrubs of the tropical *Cyrilla racemiflora* as we ever saw. We had been, and who would not be, very enthusiastic over the great beauty of fruiting *Cyrilla* at the eastern border of the Dismal Swamp but here, at a new northern and inland limit, it was quite as beautiful.

Obviously, having spent some hours in covering the 18 miles of fine road between McKenney and Stony Creek, we must postpone much of the Greensville County programme. We, consequently, went in to Emporia for one of the delicious and sumptuous dinners supplied by Mrs. Harrison and then drove north to the region of Orion. It was important to try again (after many failures) to find flowers on the puzzling *Aconitum* which leans over a woodland brook slightly below Double Bridge. At last there was a flower, a solitary one on a single plant. The two colonies here and the one at Carey Bridge are too much shaded for flowering, but the single specimen secured settles the identity. The plant will be described and illustrated (PLATE 720) in Part II. Along this brook there is a fine colony of *Lycopodium lucidulum*, and Correll, always with an eye for orchids, contributed a specimen of *Spiranthes ovalis*, already known at several stations but not in Greensville County.

Some years earlier we had picked up a few plants of the pink-rayed and very little known *Boltonia Ravenelii* Fernald & Griscom in bottomland-woods of Fontaine Creek, southwest of Haley's Bridge. The species is known only from Ravenel's original collections, made in 1846 at Santee Canal, South Carolina, and our meagre material. Starting again on this last errand, we safely passed Emporia and got nearly to Taylor's Millpond, where on a mossy savannah-like swale *Lycopodium carolinianum*, at its only known Virginia station, mingles with other paludal species. Wishing to show this *Lycopodium*-assemblage to Correll, we took time off. During our last two visits there the swale was drowned by heavy rains and we were

at disadvantage in collecting. Now it was comfortably dry and we could see the plants. Some colonies of *Lycopodium inundatum* var. *adpressum* Chapman were of the forma *polyclavatum* (McDonald) Fernald; and growing with it there was a similar form, with forked fruiting branches, of the coarser var. *Bigelovii*, the latter form not previously known. These were, however, relatively "small potatoes" as compared with the next discovery. *Muhlenbergia capillaris*, with delicate purple panicles, grows in small clumps in relatively dry soils of eastern Virginia, but here, occupying perhaps an acre of wet sphagnous swale or savannah, there was a solid stand of a *Muhlenbergia*, in dense tussocks, with bronzy-brown panicles just flowering in mid-October. The obvious course was to take a good series of it. It is fortunate that we did so, for, whereas *M. capillaris* has prolonged and slender glumes and long awns, the plant from near Taylor's Millpond has the glumes broad, short and bluntish and the awns very short. It is *M. expansa* (DC.) Trin., heretofore unknown north of southeastern North Carolina.

The stretch of bottomland on Fontaine Creek, where we vaguely remembered getting *Boltonia Ravenelii*, has grown up to a dense mass of giant herbs, and search for an hour or more failed to bring it to light. Another year, slightly earlier in the season, we may have better luck; but one plant of this area greatly interested us. We had already collected it, in September, at the margin of a bottomland of the Blackwater in Southampton, then immature. Now it was in splendid condition, a *Panicum dichotomiflorum* with tiny spikelets like those of the Cape Cod and New Jersey var. *puritanorum* Svenson, but the plants gigantic, with sprawling culms more than 6 feet long, primary panicles more than a foot long and principal leaves more than an inch broad. In the relatively dwarf northern var. *puritanorum* the narrow leaves are smooth, in this Virginia plant harshly scabrous. It will be described in Part II. In crossing the now dried-out bed of Fontaine Creek we found the logs and mossy islets carpeted with *Micranthemum umbrosum* (Walt.) Blake. We had previously known it along Three Creek, of the Nottoway System, and on the Blackwater in Isle of Wight County; now we record it from the Meherrin system.

Our last day in a very hurried trip had yielded one species

new to Virginia and a geographic variety and a minor form new to science. In fact, during our eight days in the field in October we had maintained a daily average of more than two plants new to the state, at least one a day new to science. Starting the seventh century with a score of 50 as a liberal margin, we had overtopped the 700 additions to the state flora by 51 extra; that in a region actively investigated at intervals through nine seasons. But we have not reached the end. Only the restrictions on use of gasoline blocked our programme in 1942, when, in an area not previously appreciated, we were getting in a single day four native plants new to Virginia, three of them apparently new to science. Repeating my statements in previous articles: There is plenty to do; there are few thoroughly prepared to do it.

PART II. RANGE-EXTENSIONS, TECHNICAL NOTES AND REVISIONS

In Part II, as in previous papers of the series, I have assembled in compact form for quick reference, the principal records of range-extensions found in the diffuse narrative. With them are some not there noted and a few based upon collections made by others. Several revisions of groups growing out of our Virginia observations are included. The plates have been prepared with utmost patience by my assistant, Dr. Bernice G. Schubert. The cost of the engraver's blocks has been partly met through an appropriation for personal research from the Department of Biology of Harvard University. For meeting a large part of the expense of their reproduction I am again indebted to the generosity of Mr. Long. In the citation of specimens (except in new descriptions or in formal revisions) the collectors, *Fernald & Long* (or their associates) are omitted. Plants thought to have been previously unrecorded from the state are indicated by an asterisk (*).

DRYOPTERIS CELSA (Wm. Palmer) Small. Many additional stations in Surry, Nansemond and Norfolk Counties; often so abundant as to invade soft-shoulders of roads in calcareous woods. See p. 354.

OSMUNDA CLAYTONIANA L. ISLE OF WIGHT COUNTY: rich calcareous wooded slopes along James River, west of old Fort Boykin, no 12,912. Only a single plant noticed, our first from the Coastal Plain of the state. See p. 345.

**O. CINNAMOMEA* L., var. *GLANDULOSA* Waters. KING AND

QUEEN COUNTY: sphagnous magnolia swamp at head of Garnett Creek, about 1 mile northeast of St. Stephen's Church, no. 13,209. Very abundant and the only form present. See p. 353.

LYCOPODIUM LUCIDULUM Michx. To the station already reported in Southampton County add one in GREENSVILLE COUNTY: rich woods along brook entering Nottoway River below Double Bridge, north of Orion, no. 13,506. See p. 374.

L. INUNDATUM L., var. ADPRESSUM Chapm., forma POLYCLAVATUM (McDonald) Fern. in RHODORA, xlii. 405 (1940). To the station in Sussex County add one in GREENSVILLE COUNTY: argillaceous and sphagnous meadow northwest of Taylor's Millpond, no. 13,853. See p. 375.

*L. INUNDATUM L., var. BIGELOVII Tuckerm., forma **furcatum**, f. nov., ramibus fertilibus plus minusve furcatis strobilis 1-4. GREENSVILLE COUNTY, VIRGINIA: argillaceous and sphagnous meadow northwest of Taylor's Millpond, October 14, 1941, *Fernald & Long*, no. 13,852 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.). With and closely simulating the preceding, but with the thick strobiles and loosely spreading-ascending sporophylls of var. *Bigelovii*. See p. 375.

ISOETES ENGELMANNI A. Br., var. CAROLINIANA A. A. Eaton. Range extended northward to JAMES CITY COUNTY: bottomland woods along Powhatan Creek, northwest of Five Forks, no. 13,210.

I. SACCHARATA Engelm. Local range extended to tidal shores of the Chickahominy and Rappahannock Rivers. CHARLES CITY COUNTY: Chickahominy River, Graves Landing, north of Holdercroft, no. 13,507. NEW KENT COUNTY: Chickahominy River, Lanexa, no. 13,508. ESSEX COUNTY: Rappahannock River, northeast of Loretto, no. 13,855. See p. 372.

TYPHA TRUXILLENsis HBK. To the stations on the shores of Back Bay add another in PRINCESS ANNE COUNTY: reed-marsh along Blackwater River, southwest of Pungo Ferry, no. 13,856. See p. 370.

POTAMOGETON SPIRILLUS Tuckerm. Range extended slightly southward, into CHARLES CITY COUNTY: fresh tidal margin of Chickahominy River, near Cypress Bank Landing, nos. 13,217 and 13,218. See p. 356.

ZANNICHELLIA PALUSTRIS L., var. MAJOR (Boenn.) Koch. ISLE OF WIGHT COUNTY: spring-pool in cypress swamp back of sand-beach of James River, below old Fort Boykin, no. 13,513; an extraordinary habitat, the plant (usually of brackish waters) here filling a spring-pool constantly replenished with fresh water by an active hydraulic ram! See p. 361.

SAGITTARIA WEATHERBIANA Fern. Range extended north to SURRY COUNTY: forming extensive colonies at margin of sluggish stream, Cypress Swamp, near Sexton, no. 12,920.

**S. EATONI* J. G. Sm. Sterile plants with fleshy phyllodia and no petioled blades or flowering scapes are characteristic in fresh tidal mud. They seem to be the poorly understood *S. Eatoni*, not recorded from south of the lower Delaware. ESSEX COUNTY: shore of Rappahannock River, northeast of Loretto, no. 13,858. NEW KENT COUNTY: Lacey Creek, west of Walker, no. 13,514. CHARLES CITY COUNTY: Chickahominy River, near Cypress Bank Landing, no. 13,221; Chickahominy River, Graves Landing, north of Holdcroft, no. 13,515; Chickahominy River, Matahunk Neck, no. 13,857. See pp. 356 and 368.

**S. ENGELMANNIANA* J. G. Smith, forma *DILATATA* Fern. NORFOLK COUNTY: sphagnous and peaty thickets near Jericho Ditch, Lake Drummond, Great Dismal Swamp, west of Wallace-ton, no. 13,516. Although Smith, in his Revision of the North American Species of *Sagittaria* and *Lophotocarpus*, 15 (1894), cited no positive stations from south of Delaware, he noted with a doubt a Chapman plant thought to come from Florida. It is, therefore, noteworthy that in July, 1895, the late *C. S. Williamson* collected the typical narrow-leaved *S. Engelmanniana* at Wilmington, North Carolina (Herb. Phil. Acad.) and in 1939 *Godfrey & Tryon* collected several numbers of it at Colclough Pond, northwest of Manning, in Clarendon County, South Carolina. See p. 365.

[*ECHINODORUS TENELLUS* (Martius) Buchenau was reported in Mrs. Erlanson's *Flora of the Peninsula of Virginia*, Papers Mich. Acad. Sci. Arts and Lett. iv. 120 (1924), as occurring along the Chickahominy at Lanexa, *Grimes*, no. 4135. The specimen in the Gray Herbarium of no. 4135 is of *Sagittaria subulata* (L.) Buchenau, a common species on tidal shores of the Chickahominy. No. 4135 in *Grimes's* own series (at the New York Botanical Garden), labeled *Echinodorus tenellus*, is a very rare new species of *Bacopa* (of the *Scrophulariaceae*), which, it is safe to assert, was not found at Lanexa! The bases of the report of *E. tenellus* are completely confused.]

LIMNOBIUM SPONGIA (Bosc) Steud. To the few stations in Princess Anne County add the following in NORFOLK COUNTY: springy spots and rills, sandy and peaty margin of Lake Drummond, near Jericho Ditch, Great Dismal Swamp, west of Wallace-ton, no. 13,519; very abundant in lowest areas of river-swamp along Northwest River, northeast of Northwest, no. 13,861. See pp. 365 and 370.

The correct citation of the name is *Limnobium Spongia* (Bosc) Steudel, Nom. ed. 2, ii. 45 (1841); not (Bosc) L. C. Richard, as given in Britton & Brown, Ill. Fl. i. 94 (1896) and accepted by others. The original very detailed description, with beautiful plate, was under *Hydrocharis Spongia* Bosc, Ann. Mus. d'Hist. Nat. Paris, ix. 396, t. 30 (1807). In Mém. Inst. Paris, xxxii. 32,

t. 8 (1812) Richard described as new and gave a very detailed plate of *L. Bosci* (not *L. Spongia* as recently cited) and on page 66 (the page cited by Britton & Brown for *L. Spongia*) he defined the genus *Limnobium*, without using any specific name; but on page 78, in an enumeration of genera and species of the family, he cited Bosc's original name in the synonymy of *L. Bosci*. The original specific name, *Spongia*, was first transferred into *Limnobium* by Steudel.

***BROMUS RACEMOSUS** L. ISLE OF WIGHT COUNTY: waste ground back of sand-beach of Burwell's Bay, James River, below Rushmere (Fergusson's Wharf), no. 12,923. Not mapped by Hitchcock from Virginia. See p. 344.

***B. ARVENSIS** L. ISLE OF WIGHT COUNTY: border of cultivated field back of James River, west of old Fort Boykin, no. 12,921. Cited by Hitchcock only from eastern Maryland. See p. 344.

B. PURGANS L. ISLE OF WIGHT COUNTY: specimens from seeping argillaceous and calcareous bluffs along Burwell's Bay, below Rushmere, no. 12,926, establish a record of 2 m. in height, with leaves 2 cm. broad.

FESTUCA RUBRA L. Extending up the James to northern NANSEMOND COUNTY: upper border of sandy beach of James River, Eclipse, no. 12,928.

DIPLACHNE MARITIMA Bicknell. Extending inland to ESSEX COUNTY: damp sand back of beach of Rappahannock River at Ware's Wharf, northeast of Dunnsville, no. 13,226. See p. 354.

ELYMUS VIRGINICUS L. ISLE OF WIGHT COUNTY: specimens from seeping calcareous wooded bluffs by James River, west of Fort Boykin, no. 12,932, are 1.4 m. high. See p. 345.

***E. VIRGINICUS** L., var. **JEJUNUS** (Ramaley) Bush. Eastern range extended south from New Jersey to CHARLES CITY COUNTY: cypress swamp by Chickahominy River, Cypress Bank Landing, no. 13,229. ISLE OF WIGHT COUNTY: base of rich calcareous wooded slopes by Burwell's Bay, James River, below Rushmere, no. 13,227. See p. 357.

E. RIPARIUS Wiegand. To the few recorded stations add one in SUSSEX COUNTY: alluvial woods along Nottoway River, Green Church Bridge, northwest of Owen's Store, no. 13,864.

AIRA PRAECOX L. To the few recorded stations add one in NANSEMOND COUNTY: sandy clearing near Western Branch, south of Reid's Ferry, no. 13,230.

LEPTOCHLOA FILIFORMIS (Lam.) Beauv. Local range extended to PRINCE GEORGE COUNTY: weed in cultivated field by James River, Jordan Point, no. 13,530. In RHODORA, xlii. 390 (1940) this species, as a weed in Petersburg, was recorded by clerical error as *L. fascicularis*, which we do not know in Virginia.

AGROSTIS STOLONIFERA L., var. COMPACTA Hartm. To the few recorded stations add one in NANSEMOND COUNTY: border of brackish marsh along Western Branch, south of Reid's Ferry, no. 13,231.

*PHLEUM PRATENSE L., var. NODOSUM (L.) Richter. ISLE OF WIGHT COUNTY: turfy waste ground back of sand-beach of Burwell's Bay, James River, below Rushmere (Fergusson's Wharf), no. 12,935.—Differing from typical *P. pratense* in its more slender inflorescence, with shorter and smoother spikelets, with less bristly-ciliate keels. Our first American collection. See p. 344.

*MUHLENBERGIA EXPANSA (DC.) Trin. (*M. trichopodes* Chapm.). GREENSVILLE COUNTY: argillaceous and sphagnous meadow northwest of Taylor's Millpond, no. 13,866, growing in large stools over an extensive area. The first from north of Wilmington and adjacent area in southeastern North Carolina. See p. 375.

*M. BRACHYPHYLLA Bush. SUSSEX COUNTY: border of Assa-moosick Swamp, about 2 miles northeast of Homeville, no. 8956; moist argillaceous pineland about 2 miles east of Stony Creek, no. 9532. DINWIDDIE COUNTY: open argillaceous low woods just east of McKenney, no. 13,865.—First from east of Indiana, Missouri and eastern Texas, Deam speaking of it as growing in Indiana "in low, flat woods", Palmer & Steyermark assigning it in southern Missouri the habitat, "Prairie banks and low moist woods". In habit the plant suggests very slender but unusually branched *M. foliosa*, with rhizomes, panicles, glumes and long-awned lemmas of *M. tenuiflora* of more upland and richer habitats, the slender lateral branches numerous and terminated by exserted panicles, the internodes glabrous throughout or barely scabrous at summit, the callus and base of lemma bearded. See p. 373.

PASPALUM FLUITANS (Ell.) Kunth. To the few recorded stations add one in SOUTHAMPTON COUNTY: open muddy and sandy borders of pools, alluvial bottomlands of Three Creek, Druryville, no. 13,538. See p. 367.

PANICUM CAERULESCENS Hack. Local range extended inland to DINWIDDIE COUNTY: open argillaceous low woods just east of McKenney, no. 13,871. NORFOLK COUNTY: fresh reed-marsh and swale along Northwest River near Northwest, no. 13,872.

P. MUTABILE Scribn. & Sm. Local range extended to northern NANSEMOND COUNTY: dry sandy woods along Nansemond River, east of Cahoon Pond, northwest of Suffolk, no. 13,246.

P. RAVENELII Scribn. & Merr. Range extended northward to KING WILLIAM COUNTY: sandy oak woods southwest of Aylett, no. 13,245.

*PANICUM DICHOTOMIFLORUM Michx., var. **imperatorum**, var.

nov., culmis crassis 0.8–2 m. altis deinde depressis furcatisque; vaginis glabris, laminis primariis 0.7–2.5 cm. latis paginis superioribus scaberrimis; paniculis primariis breviter exsertis 2–4 dm. longis, paniculis lateralibus deinde numerosis late ovoideis ramis horizontaliter divergentibus; spiculis oblongo-lanceolatis vel anguste ellipsoideis breviter acutiusculis 1.8–2.3 mm. longis, gluma superiore lemmateque sterili submembranaceis fructus paullo superantibus.—VIRGINIA: damp clearing in woods along Blackwater River, east of Oak Grove School, Southampton County, September 11, 1941, *Fernald & Long*, no. 13,540 (primary panicle partly expanded); wooded bottomland, Fontaine Creek, southwest of Haley's Bridge, Greensville County, October 14, 1941, *Fernald & Long*, no. 13,877 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.), primary panicle over-ripe, lateral panicles mature. See p. 375.

Panicum dichotomiflorum, var. *imperatorum* (of the Dominions) is the southern representative of var. *puritanorum* Svenson in RHODORA, xxii. 154 (1920). In its short, thick and short-tipped spikelets with submembranaceous 2nd. glume and sterile lemma it is inseparable from the northern var. *puritanorum* and might be taken for a gigantic development of that small plant (culms slender, 0.3–6 dm. high or long; leaf-blades 1–8 mm. broad; primary panicle 0.2–2.5 dm. long); but var. *puritanorum* has the leaf-surfaces quite smooth (margins sometimes scabridulous), while the surfaces of the blades of var. *imperatorum* are harsh above and often below. In typical *P. dichotomiflorum* and var. *geniculatum* (Wood) Fernald in RHODORA, xxxviii. 387, pl. 441, fig. 2 (1936) and var. *bartowense* (Scribn. & Merr.) Fernald, l. c. the more slender and acuminate spikelets are 2.6–3.6 mm. long, the 2nd. glume and sterile lemma subcoriaceous.

P. HEMITOMON Schultes. To the few recorded Virginia stations add one in NORFOLK COUNTY: extensive colonies at border of wooded swamp along Northwest River, southeast of Cornland, nos. 13,875 and 14,280. See p. 369.

SACCIOLEPIS STRIATA (L.) Nash, forma **gibba** (Ell.), comb. nov. *Panicum gibbum* Ell., Sketch Bot. S. C. and Ga. i. 116 (1816). *P. Elliottianum* Schultes, Mant. ii. 256 (1824). *S. gibba* (Ell.) Nash in Britton, Man. 89 (1901). See p. 355.

Typical *Sacciolepis striata* is glabrous throughout. The type of the species is Clayton's no. 590 in the Linnean Herbarium, described by Linnaeus as *Holcus striatus* L. Sp. Pl. ii. 1048 (1753), with an unusually full diagnosis, with "*vaginis crassiusculis*

striatis", but no mention of pubescence. The Grovonian description of no. 590, cited by Linnaeus, similarly makes no mention of pubescence; and a photograph of this type, in the Gray Herbarium, shows perfectly glabrous sheaths. This plant, with glabrous sheaths is wide-ranging, from Texas to Florida and the West Indies, northward to Oklahoma, Tennessee and on the Coastal Plain to southern New Jersey. All our collections from the James River northward belong to it.

South of the James in Virginia the plant sometimes has the lower, middle and sometimes the upper sheaths hirsute, this hirsute-sheathed form occurring occasionally to Florida and Texas; but that it is less common south of Virginia than the glabrous-sheathed plant is evident even from the meagre representation of the species in the Gray Herbarium: from North Carolina typical *S. striata* (glabrous sheaths) 3, forma *gibba* (hirsute sheaths) 1; Florida, typical *S. striata* 17, forma *gibba* 1. Forma *gibba* is *Panicum gibbum* Ell. or *Sacciolepis gibba* (Ell.) Nash; Elliott's detailed description noting the "leaves . . . somewhat scabrous, pubescent, expanding; sheaths . . . , the lower ones hispid".

The Virginia material in the Gray Herbarium is as follows. SACCIOLEPIS STRIATA (L.) Nash (typical). STAFFORD COUNTY: Brooke, *F. J. Hermann*, no. 10,408. NEW KENT COUNTY: Windsor Shades, no. 11,244. WARWICK COUNTY: east of Harpersville, no. 8579. PRINCESS ANNE COUNTY: near Creed's, no. 4775.

*FORMA GIBBA (Ell.) Fern. PRINCESS ANNE COUNTY: Virginia Beach, *Heller*, no. 1263, *Fernald, Griscom & Long*, no. 4546; Rifle Range, south of Rudy Inlet, no. 4264; Cedar Island, no. 12,260. NORFOLK COUNTY: Lake Drummond, Great Dismal Swamp, no. 13,238; border of wooded swamp along Northwest River, southeast of Cornland, no. 13,879. DINWIDDIE COUNTY: Burgess, no. 7294.

ECHINOCHLOA WALTERI (Pursh) Heller, forma LAEVIGATA Wieg. Range extended inland to NORFOLK COUNTY: wet woods and thickets near the Feeder Ditch from Lake Drummond, Great Dismal Swamp, west of Wallaceton, no. 13,545; deep peat and mud, southeastern shore of Lake Drummond, no. 13,546.

SETARIA MAGNA Griseb. Add other stations in NORFOLK COUNTY: border of roadside ditch in wooded swamp along Northwest River, southeast of Cornland, no. 13,882; disturbed soil, wet woods and thickets near the Feeder Ditch from Lake Drummond, Great Dismal Swamp, west of Wallaceton, no. 13,549.

ERIANTHUS BREVIBARBIS Michx. To the single recorded station add another in SUSSEX COUNTY: alluvial woods along Nottoway River, Green Church Bridge, northwest of Owen's Store, no. 13,884. See p. 367.

ANDROPOGON PRAEMATURUS* Fernald, forma **hirtivaginat*us*, f. nov., vaginis basilaribus hirtis vel pilosis. TYPE: open pine-land near Mason's Siding, about 1 mile north of Henry, Sussex County, Virginia, August 3, 1941, *Fernald & Long*, no. 13,248.

Andropogon praematurus Fernald in *RHODORA*, xlii. 413, t. 626, figs. 1-3 (1940), like so many species of the genus, has the sheaths either quite glabrous or obviously pubescent. The TYPE, *Fernald & Long*, no. 10,092, is strictly glabrous. The originally cited material of *A. praematurus* consisted of both the glabrous and the pubescent-sheathed forms, which often, as in other species, grow side by side.

CYPERUS OVULARIS (Michx.) Torr., var. *SPHAERICUS* Boeckl. To the single recorded station add three others. JAMES CITY COUNTY: sandy roadside bank about 2 miles northwest of Toano, no. 13,258; clearing in woods south of Ewell, no. 13,259. GREENSVILLE COUNTY: exsiccated argillaceous fallow field near Meherrin River, northeast of Gaskins, no. 13,261.

FIMBRISTYLIS CASTANEA (Michx.) Vahl. Range extended inland to ESSEX COUNTY: damp sand back of beach of Rappahannock River at Ware's Wharf, northeast of Dunnsville, no. 13,270. See p. 354.

F. CAROLINIANA (Lam.) Fern. With the last, no. 13,271. See p. 354.

ELEOCHARIS PARVULA (R. & S.) Link. Extensive inland station in northern NANSEMOND COUNTY: carpeting a shallow pool, border of salt marsh by James River, Eclipse, no. 12,945.

E. ALBIDA Torr. Extending inland to ESSEX COUNTY: damp sand back of beach of Rappahannock River at Ware's Wharf, northeast of Dunnsville, no. 13,266. See p. 354.

E. TORTILIS (Link) Schultes. Inland to KING AND QUEEN COUNTY: sphagnous magnolia swamp at head of Garnett Creek, about 1 mile northeast of St. Stephen's Church, no. 13,268. See p. 353.

SCIRPUS POLYPHYLLUS Vahl. KING WILLIAM COUNTY: border of magnolia swamp about 2 miles northeast of St. Stephen's Church, no. 13,272. Our first collection on the Coastal Plain of the state. See p. 353.

S. ERIOPHORUM* Michx., forma **praelongus, f. nov., spiculis deinde 8-12 mm. longis.—VIRGINIA: damp peaty depressions in sandy pineland, Cape Henry, September 7, 1935, *Fernald & Long*, no. 4821; fresh reed-marsh and swale along Northwest

River near Northwest, October 11, 1941, *Fernald & Long*, no. 13,894 (TYPE in Herb. Gray.).

The counterpart in *Scirpus Eriophorum* of similar forms with the rachillas of the spikelets much prolonged, such as are occasionally found in other species of the genus and in *Cyperus* and other genera. In both collections of forma *praelongus* the inflorescence is very small for the species, only 1–1.5 dm. high and about 1 dm. broad. Well developed typical *S. Eriophorum* (with spikelets 3–7 mm. long) has the inflorescence 2–3.5 dm. high and 1.5–2.5 dm. broad. In forma *praelongus* the vigor of the plant seems to concentrate on the spikelets!

ERIOPHORUM VIRGINICUM L. To the few recorded stations on the Coastal Plain of the state add one in NORFOLK COUNTY: sphagnous and peaty thickets near Jericho Ditch, Lake Drummond, Great Dismal Swamp, west of Wallaceton, no. 13,560. See p. 364.

RHYNCHOSPORA MACROSTACHYA Torr. Thus far typical *R. macrostachya* is known in the state only from shores of Lake Drummond. To old collections by others, add our nos. 13,563 and 13,564, both from NORFOLK COUNTY. See p. 364.

R. MACROSTACHYA Torr., var. COLPOPHILA Fernald & Gale. To the localities already listed add the following, all on fresh tidal shores and marshes. CAROLINE COUNTY: Rappahannock River, Port Royal, no. 13,897. ESSEX COUNTY: Rappahannock River, northeast of Loretto, no. 13,898. CHARLES CITY COUNTY: Chickahominy River, Cypress Bank Landing, no. 13,565. NORFOLK COUNTY: Northwest River near Northwest, no. 13,896. See pp. 369 and 372.

R. ALBA (L.) Vahl. PRINCESS ANNE COUNTY: savannah-like opening in wooded swamp of North Landing River, west of Pungo Ferry, no. 13,899. Our first evidence of this circumboreal species on the Coastal Plain of the state. See p. 371.

R. HARVEYI Wm. Boott. To the few recorded stations add one in SUSSEX COUNTY: very local, open pineland near Mason's Siding, about 1 mile north of Henry, no. 13,274.

R. CEPHALANTHA Gray. To the very few stations add one in DINWIDDIE COUNTY: depression in argillaceous woods west of Winfield's Mill, nos. 13,901 and 13,902. See p. 374.

R. MICROCEPHALA Britton. Local range extended to KING AND QUEEN COUNTY: sphagnous magnolia swamp at head of Garnett Creek, about 1 mile northeast of St. Stephen's Church, no. 13,275.

R. CHALAROCEPHALA Fernald & Gale. NORFOLK COUNTY: finely developed and abundant on shores of Lake Drummond, nos. 13,276, 13,277 and 13,540. See pp. 359 and 365.

R. CADUCA Ell. To the several localized stations add the fol-

lowing in NORFOLK COUNTY: wooded river-swamp and margin of Northwest River, northeast of Northwest, nos. 13,904 and 13,905. See p. 370.

**R. MILIACEA* (Lam.) Gray. NORFOLK COUNTY: old specimen in Herb. Phil. Acad., coll. *Reed*.

**CLADIUM MARISCOIDES* (Muhl.) Torr. PRINCESS ANNE COUNTY: border of swampy or inundated woods, north of Blackwater River, no. 3802; savannah-like opening in wooded swamp of North Landing River, west of Pungo Ferry, no. 13,907. NORFOLK COUNTY: fresh reed-marsh and swale along Northwest River, near Northwest, no. 13,906. See p. 369.

**CAREX RUTHII* Mackenz. SMYTH COUNTY: at 2500 feet along Nick's Creek, near base of Pine Glade Mountain, June 4, 1892, *J. K. Small*, distrib. as *C. echinata* Murr.—*C. Ruthii*, described from Big Craggy Mountain, Buncombe County, North Carolina, and recorded by Mackenzie as otherwise known only from the mountains of eastern Tennessee and of Georgia, indicates the rich harvest of northern extensions to be made when the westernmost counties of Virginia are thoroughly scrutinized; as does, also, *Eupatorium roanense*, described by Small only from Roan Mountain at the border of Tennessee and North Carolina. See discussion under *Eupatorium*.

C. NORMALIS Mackenz. To the very few recorded Coastal Plain stations add one in SURRY COUNTY: alluvial woods along Gray's Creek, west of Old Courthouse Corners, no. 9845.

C. FESTUCACEA Schkuhr, *sensu* Mackenz. Whereas *C. straminea* Willd., *sensu* Mackenz., is very common in southeastern Virginia, *C. festucacea* is local. The following nos. are before me. ELIZABETH CITY COUNTY: borders of old fields in dry soil near Buckroe, *B. L. Robinson*, no. 338; marshy border of woods between Buckroe and Hampton, *Robinson*, no. 338^a; both distrib. as *C. straminea*. SUSSEX COUNTY: alluvial bottomland woods along Nottoway River, west of Homeville, no. 11,754; swales and wet thickets south of Stony Creek, no. 11,755.

C. HORMATHODES Fern. To Grimes's stations in James City County add one in ISLE OF WIGHT COUNTY: swale by Burwell's Bay, James River, at Bailey's Beach, near Rushmere, no. 12,690. See p. 344.

**C. PHYSORHYNCHA* Liebm. DINWIDDIE COUNTY: dry meadow, clearing along Appomattox River, just above the "fall-line", about 2 miles west of Petersburg, no. 11,770; extension north from South Carolina.

**C. NIGROMARGINATA* Schweinitz, var. *FLORIDANA* (Schweinitz) Kükenthal (*C. floridana*). ELIZABETH CITY COUNTY: in the graveyard, Fortress Monroe, April 8, 1887, *G. G. Kennedy* in Gray Herb.

Var. *floridana* differs from *Carex nigromarginata* in its loosely stoloniferous habit, with horizontally elongate, slender stolons, less fibrillose bases of the old leaves, uniformly pale scales (*C. nigromarginata* may have the scales pale), and less sharply trigonous achenes. In the North American Flora, xviii⁴. 192 (1935) Mackenzie gives it the range, "Georgia and Florida to Texas," adding the "NOTE: *Carex nigromarginata* Schw. occasionally has light-colored scales when growing in dense shade. It is probably such a specimen which is the basis of the record of *Carex floridana* from Virginia given by Kükenthal in Engler (Pflanzenreich 4²⁰: 445), from which is taken the statement in Britton & Brown (Ill. Fl. ed. 2. 1: 393)." Dr. Kennedy's material from Fortress Monroe, although young, has the horizontal and slender stolons nearly 2 dm. long, the scarcely fibrillose sheaths and the pale spikes which in combination place it in var. *floridana*. Similarly, Weatherby & Griscom's no. 16,460 from Horry County, South Carolina, was correctly reported by them as var. *floridana* (when they proposed the reduction of *C. floridana* to the varietal status already given it by Kükenthal in 1909) in RHODORA, xxxvi. 39 (1934).

**C. DEBILIS* Michx., var. *INTERCURSA* Fernald in RHODORA, xlv. (1942). HENRICO COUNTY: Richmond, May 9, 1894, *J. R. Churchill*. GREENSVILLE COUNTY: argillaceous clearing in swampy woods near Readjuster Bridge over Nottoway River, northeast of Orion, no. 12,016. See p. 348.

C. ABSCONDITA* Mackenz., var. **rostellata var. nov., foliis firmis glaucescentibus; perigyniis 3–4.5 mm. longis rostellatis; squamis foemineis 2–3 mm. longis.—VIRGINIA: swampy depressions in pine barrens, south of Lee's Mill, Isle of Wight County, June 8, 1940, *Fernald & Long*, no. 12,012 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.); woods near Hampton, May 16, 1905, *C. F. Wheeler*. ALABAMA: wet woods about half a mile south of Ocklocknee, Leon County, April 12, 1925, *R. M. Harper*, no. 13.

Var. *rostellata* has the large and definitely beaked perigynium and the relatively firm leaves of the extreme southern (Floridan) *Carex abscondita*, var. *glauca* (Chapm.) Fernald in RHODORA, xxxvii. 406 (1935), i. e. *C. magnifolia* Mackenzie. That variety, however, has the pistillate scales very short, only 1–barely 2 mm. long and about one fourth the length of the perigynia, whereas in var. *rostellata* they are about half the length of the

perigynia. In eastern Virginia, typical *C. abscondita*, a plant with subflaccid leaves, essentially beakless perigynia 2.5–3.5 mm. long and scales rarely more than one third their length, is a plant of the richest woodlands. Var. *rostellata*, on the other hand, occurs in acid and swampy pine barren.

*× *C. absconditiformis*. hybr. nov. (*C. abscondita* Mackenz. × *C. laxiculmis* Schwein.), planta inter *C. absconditam* et *C. laxiculmem* intermedia; foliis pallide viridibus subglauciscentibus ad 4.5 dm. longis 7–10 mm. latis; culmis vel 0.5–1.5 cm. altis bracteis valde prolongatis spiculisque ut in *C. abscondita* vel culmis elongatis 3–4.5 dm. altis spicis remotis longe pedunculatis, stamineis longe pedunculatis, bracteis brevibus.—VIRGINIA: bottomland woods along Nottoway River, east of Huske, Sussex County, June 13, 1941, *Fernald & Long*, no. 12,969 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.); rich woods south of Hotwater, James City County, July 22, 1938, *Fernald & Long*, no. 8622. See p. 348.

× *Carex absconditiformis* greatly puzzled us in the field, where a considerable carpet of it combines in a most perplexing fashion the characters of *C. abscondita* and *C. laxiculmis*. Typical *C. abscondita* has the culms 0.5–2 dm. high, mostly somewhat hidden among the bases of the prolonged leaves (up to 3 dm. long and 4–9 mm. broad); the bracts greatly prolonged above the inflorescence, the upper subspathiform and much overtopping the crowded upper spikes, this fascicle of spikes with the short staminate one shorter than and somewhat hidden among the pistillate ones; and the pistillate scales are blunt. *C. laxiculmis* has elongate culms, up to 6 dm. high, these mostly overtopping the very glaucous leaves (up to 4.5 dm. long and to 12 mm. broad), the spikes scattered on long arching peduncles in the axils of relatively short and narrow non-spathiform bracts, the long staminate spike raised on a long peduncle; and the pistillate scales are awned or pointed.

× *Carex absconditiformis* is as exact a combination of the two as can be imagined: leaves as long and broad as in *C. laxiculmis* but not so glaucous; some short culms of *C. abscondita*, with the prolonged and spathiform bracts, crowded upper pistillate spikes and hidden staminate one, with pistillate scales either blunt or cuspidate; other culms from the same crown prolonged and with short bracts, scattered and long-peduncled pistillate spikes, with

the long staminate spike peduncled and the pistillate scales often blunt, as in *C. abscondita*.

* \times *C. COPULATA* (Bailey) Mackenzie (*C. digitalis* Willd. \times *C. laxiculmis* Schwein.) SURRY COUNTY: dry woods near Blackwater River, about 1 mile southwest of Dendron, no. 12,964. SUSSEX COUNTY: bottomland woods along Nottoway River, east of Huske, no. 12,970. See p. 348.

\times *Carex copulata* is, it seems to me, a semi-fertile hybrid of *C. digitalis* and *C. laxiculmis*. The trivial name was given by Bailey because the plant seemed to him to unite those two species. His original account was as follows:

57.—*CAREX DIGITALIS*, Willd., var. *COPULATA*.

C. retrocurva, var. *copulata*, Bailey, Herb. Distr. 1886.

Larger than the species, the culms weak and reclining, sometimes two feet long; leaves twice or thrice broader; spikes shorter and heavier; perigynium mostly larger.—Woods, central Michigan, where it is common. In aspect much like *C. laxiculmis*, but has no glaucousness, the upper spikes are shorter peduncled, and minor characters also separate them. I find it to be connected with *C. digitalis* by intermediate forms.—Bailey in Mem. Torr. Bot. Cl. i. 47 (1889).

It could have been said with more precision that it is "connected with" *C. laxiculmis*. Its broad and prolonged leaves, weak culms, "sometimes two feet long", its shorter and heavier spikes and larger perigynia are characters of the latter. Lack of bloom and the "minor characters" unstated placed it with *C. digitalis*. Additional material showing it to be as near *C. laxiculmis* Schwein. (*C. retrocurva* Dewey), I transferred it as *C. laxiculmis* var. *copulata* in RHODORA, viii. 183 (1906); but Mackenzie treats it as a species, *C. copulata* (Bailey) Mackenzie in N. Am. Fl. xviii⁵. 251 (1935). Mackenzie cites it from New Jersey, Pennsylvania, Ohio, Michigan, Indiana, Iowa and Missouri; and he says with characteristic assurance: "It is widely distributed and is certainly not a hybrid." Having once camped for nearly a month with Mackenzie and witnessed the promptness with which he decided, when no other member of the party could find and none of the material collected shows well-filled achenes, that \times *C. mainensis* Porter is a fertile species, I learned to look into matters before accepting his verdicts so positively asserted. So with \times *C. copulata*. *C. digitalis* and *C. laxiculmis* are certainly good species. \times *C. copulata* so combines their characters that Bailey threw it both ways and stated that it had

characters of both. In the Gray Herbarium the material gives the following score.

CONNECTICUT: Waterford, June 13, 1896, *C. B. Graves*, no good perigynia.

NEW JERSEY: Lower Valley, Hunterdon County, June 30, 1938, *Benner*, no. 8201, no developed perigynia at this late date; Pensauken, Camden County, June 15, 1918, *Long*, no. 19,091, no developed perigynia; Blackwood, Gloucester County, June 1, 1918, *Long*, no. 18,824 no developed perigynia.

PENNSYLVANIA: Lycoming County, May 27, 1939, *Wahl*, no. 291, perigynia soft, not well filled; Leolyn, Tioga County, June 5, 1937, *Clausen & Wahl*, no. 2512, some perigynia distended, most of them not.

VIRGINIA: Dendron, June 14, 1941, *Fernald & Long*, no. 12,964, no perigynia distended; east of Huske, June 13, 1941, *Fernald & Long*, no. 12,790, most perigynia soft and not distended.

MICHIGAN: Lansing, June 1, 1886, *Bailey*, *N. Am. Carices*, no. 161 (ISOTYPE), some perigynia distended, some not; Alma, June 15, 1895, *Charles A. Davis*, distended perigynia.

OHIO: Florence, July 24, 1897, *Moseley*, perigynia not distended.

INDIANA: Hometown, Allen County, May 17, 1915, *Deam*, no. 15,692, perigynia not distended.

ILLINOIS: Joliet, June 15, 1904, *Wheeler & Skeels*, no. 268, perigynia mostly not distended.

Material of characteristic *Carex digitalis* and of *C. laxiculmis* shows no such proportion of unfilled perigynia.

C. COLLINSII Nutt. To the very few recorded stations add one in KING AND QUEEN COUNTY: sphagnous magnolia swamp at head of Garnett Creek, about 1 mile northeast of St. Stephen's Church, no. 13,285. See p. 353.

ERIOCAULON DECANGULARE L. To the very few recorded stations note one in NORFOLK COUNTY: sphagnous pocket at border of reed-marsh of Northwest River near Northwest, no. 13,908; already recorded by Kearney from Northwest. See p. 370.

E. PARKERI Robins. Local range extended to fresh tidal shores in four counties. CHARLES CITY COUNTY: Chickahominy River, near Cypress Bank Landing, no. 13,287. NEW KENT COUNTY: Lacey Creek, west of Walker, no. 13,576. CAROLINE COUNTY: Rappahannock River, northwest of Return, no. 13,909. ESSEX COUNTY: Rappahannock River, northeast of Loretto, n. 13,910. See p. 372.

XYRIS CAROLINIANA Walt., forma *FLACCIDA* Fern. Local range extended to NEW KENT COUNTY; fresh tidal shore of Lacey Creek, west of Walker, no. 13,577.

**X. FIMBRIATA* Ell. NORFOLK COUNTY: east shore of Lake Drummond, Great Dismal Swamp, July 22, 1918, *J. Arthur Harris*, no. C18,119; edge of Lake Drummond, October 2, 1921, *Grimes*, no. 4527; wet sand and peat, near entrance to Ports-

mouth Ditch, Lake Drummond, very scarce, no. 13,585. Apparently rare as compared with *X. caroliniana* Walt. and *X. difformis* Chapm., which abound around Lake Drummond. See p. 364.

ANEILEMA KEISAK Hassk. Range extended north to ESSEX COUNTY: sandy and muddy tidal shore of Rappahannock River, northeast of Loretto, no. 13,912. Also along south side of James River in PRINCE GEORGE COUNTY (Flowerdew Hundred, no. 12,982) and in SURRY COUNTY (Claremont, no. 13,586). See p. 372.

JUNCUS SUBCAUDATUS (Engelm.) Coville & Blake. Local range extended into KING AND QUEEN COUNTY: sphagnous magnolia swamp at head of Garnett Creek, about 1 mile northeast of St. Stephen's Church, no. 13,298, gigantic plants with sprangling inflorescences 2.5 dm. long. See p. 353.

J. CAESARIENSIS Coville. To the scattered stations recorded add one in JAMES CITY COUNTY: sphagnous border of shallow peaty pond-hole $\frac{1}{2}$ mile east of Centerville, no. 13,297.

UVULARIA PUDICA (Walt.) Fern., var. *NITIDA* (Britton) Fern. Local range extended into DINWIDDIE COUNTY: scarce in dry woods west of Winfield's Mill, no. 13,916.

HEMEROCALLIS FULVA L., var. *KWANSO* Regel. SURRY COUNTY: very abundant on sand-beach of Cobham Bay, James River, northwest of Chippokes, no. 13,300; obviously spread from near a deserted and collapsed dwelling and rapidly propagating.

LACHNANTHES TINCTORIA (Walt.) Ell. NORFOLK COUNTY: edge of Lake Drummond, Great Dismal Swamp, October 2, 1921, Grimes, no. 4536; wet sandy and peaty shore near entrance to "the Feeder", Lake Drummond, no. 13,304; similar habitat near entrance to Portsmouth Ditch, Lake Drummond, no. 13,305. NANSEMOND COUNTY: muddy and peaty southwestern shore of Lake Drummond, no. 13,590. See pp. 354 and 365.

So far as we yet know Lake Drummond is the only locality in Virginia where *Lachnanthes* is unquestionably indigenous, its colony on a cranberry-meadow in Augusta County (Carr, RHODORA, xlii. 92) being, according to Professor Massey, a probable introduction with cranberry-plants. So far as shown in the Gray Herbarium *Lachnanthes* is not found in North Carolina north of the lower Neuse, nor between Lake Drummond and Delaware. It was not recorded by Kearney from Lake Drummond.

**LEUCOJUM AESTIVUM* L. ISLE OF WIGHT COUNTY: about $\frac{1}{2}$ acre of densely crowded plants at border of woods (old house-site) near James River, west of old Fort Boykin, no. 12,992. HANOVER COUNTY: very abundant over many acres of bottom-

land woods along Pamunkey River, north of Old Church, no. 14,131. See p. 344.

HYPOXIS LEPTOCARPA Engelm. & Gray. Range extended into two additional counties. **SURRY COUNTY**: bottomland woods along Blackwater River, about 1 mile southwest of Dendron, no. 12,991. **ISLE OF WIGHT COUNTY**: sandy, recently cleared woods along Blackwater River, below Broadwater Bridge, north of Zuni, no. 13,306.

SPIRANTHES OVALIS Lindl. To the scattered stations add one in **GREENSVILLE COUNTY**: rich woods along brook entering Nottoway River below Double Bridge, north of Orion, very rare, no. 13,921. See p. 374.

S. CERNUA (L.) Richard, var. *ODORATA* (Nutt.) Correll. Range extended north to **NEW KENT COUNTY**: fresh tidal shore of Chickahominy River, Lanexa, no. 13,922.

BASAL SPROUTS OF QUERCUS ALBA.—In dry woods near the Nottoway River, near Peter's Bridge in Sussex and Southampton Counties, there occur dense circles of low oaks with prolonged subterranean rooting stems. These low shrubs, often only 2.5–5 dm. high are all sterile and they do not have the foliage of any of the low and stoloniferous species of the extreme South. Returning in June, 1941, to study them further and, if possible, to secure young fruit, we were so fortunate as to find, southwest of Lambs, a very complete circle of such young leafy shoots directly under the outer tips of the branches of a large standing White Oak. Digging down at the inner side of the circle we found that the deceptive sprouts were attached to roots, often 3–6 cm. in diameter, of the large tree. Such sprouting of *Quercus alba* is not mentioned in any discussions of the species which have come to hand. It is represented by our nos. 12,314 and 12,998.

* \times *QUERCUS FERNOWI* Trelease (*Q. alba* \times *stellata*). **NANSEMOND COUNTY**: dry sandy woods above Nansemond River, east of Cahoon Pond, northwest of Suffolk, no. 13,321, a small shrubby tree less than 2 m. high, presumably derived in part from one of the smaller extremes of *Q. stellata*.—A hybrid previously recorded from the District of Columbia, Missouri and Alabama.

Q. LYRATA* Walt., forma *VIRIDIS* Trelease. **PRINCE GEORGE COUNTY: river-swamp of Blackwater River, north of Disputanta, no. 5762. **DINWIDDIE COUNTY**: alluvial woods near head of Old Town Creek, northwest of Petersburg, no. 6190. **SOUTHAMPTON COUNTY**: sandy alluvial bottomlands of Three Creek, Drewryville, no. 5761.

Ordinarily *Quercus lyrata* has the leaves permanently whitish to gray beneath with minute tomentum. The numbers cited above have the lower surfaces glabrous and green. Although Trelease's description is merely in a key, "Leaves green beneath . . . f. *viridis*" and he accompanies it by no citation of specimens, I assume that trees like the above are what he intended.

Q. PALUSTRIS DuRoi. Range extended southward into GREENSVILLE COUNTY: bottomland woods along Meherrin River, northeast of Gaskins, no. 13,000. To be expected in North Carolina, farther down-river. See p. 349.

Q. NIGRA L., var. *TRIDENTIFERA* Sargent. To the single Virginia station (Suffolk) cited by Sargent in Bot. Gaz. lxx. 429 (1918) add the following from NORFOLK COUNTY: dry woods west of Bethel Church, Gertie, nos. 13,929 and 13,930; dry woods east of Cedarville, no. 13,932. GREENSVILLE COUNTY: along a seepy old woodroad north of Dahlia, no. 9912, distrib. as *Q. nigra* × *Phellos*. See p. 369.

Sargent, Man. Trees N. Am. ed. 2: 261 (1922) speaks of "var. *tridentifera* Sarg. rare and local; southwest Virginia to Alabama", etc. Noting in passing that Suffolk, cited with the original description, is in southeastern (not "southwest") Virginia, we got the impression that var. *tridentifera*, which often has some simple and narrowly oblong to oblanceolate leaves below the deeply 3-cleft upper ones, is the result of crossing of *Q. nigra* and *Q. Phellos*.

Q. PHELLOS* L., forma **intonsa, f. nov., foliis subtus semper sericeo-tomentulosis, pilis albidis vel cinereis.—DELAWARE: near Wilmington, *Canby*. VIRGINIA: large tree in dry woods by York River, above Mt. Folly, York County, July 28, 1941, *Fernald & Long*, no. 13,324 (TYPE in Herb. Gray., ISOTYPE in Herb. Phil. Acad.); swampy woods southeast of Joyner's Bridge, Isle of Wight County, July 17, 1940, *Fernald & Long*, no. 12,328.

Quercus Phellos commonly has the leaves glabrous or, if pubescent upon unfolding, promptly glabrate. Sargent, Sylva, viii. 179 (1895), cites the *Canby* specimen in the Gray Herbarium as the only one he had ever seen with the leaves permanently pubescent beneath. The tree below Joyner's Bridge had fallen and was thought to be perhaps not normal in its foliage. The large tree above Mt. Folly is sturdy and fertile; there is no question of its virility.

POLYGONUM TENUE* Michx., var. **protrusum, var. nov. calycibus maturis 1.5–2 mm. longis, sepalis exterioribus rotundato-ovatis quam interioribus duplo longioribus; achaeniis nigricantibus valde exsertis.—VIRGINIA: dry sand of gravel-pit near Blackwater River, southeast of Ivor, Southampton County, October 16, 1941, *Fernald & Long*, no. 13,937 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.). Notable for the very short calyx with broad and rounded sepals and the strongly exerted black achene.

P. SAGITTATUM* L., var. **gracilentum, var. nov., foliis anguste lanceolato-sagittatis, primariis 3.5–6.5 cm. longis 5.5–10.5 mm. latis, superioribus valde reductis; internodiis superioribus perlongis superne laevibus.—Fresh to brackish tidal marshes, southeastern VIRGINIA: brackish marsh along Piscataway Creek, northwest of Dunnsville, Essex County, August 1, 1941, *Fernald & Long*, no. 13,331 (TYPE in Herb. Gray., ISOTYPE in Herb. Phil. Acad.); fresh tidal marsh by Lacey Creek, west of Walker, New Kent County, September 9, 1941, *Fernald & Long*, no. 13,602 (transitional); fresh tidal margin of Chickahominy River, near Cypress Bank Landing, Charles City County, September 9, 1941, *Fernald & Long*, no. 13,602. See p. 353.

Typical *Polygonum sagittatum* L. (var. *americanum* Meisner) has oblong- to narrowly ovate-lanceolate leaf-blades, the primary ones ranging from 1.3–10 cm. long and 0.7–2.8 cm. broad, averaging two-fifths as broad as long, the upper ones well developed; the upper internodes are retrorsely barbed essentially to summit and not conspicuously elongate. In var. *gracilentum* the upper internodes are much longer than the lower and median ones, 8–14 cm. long, smooth (except sometimes toward base); and the narrow lanceolate leaves average one sixth as broad as long, the uppermost becoming reduced to tiny bracteiform blades.

**CHENOPODIUM BERLANDIERI* Moq. DINWIDDIE COUNTY: abundant and spreading from a freight-yard, Petersburg, no. 13,941. GREENSVILLE COUNTY: railroad-yard, North Emporia, no. 9320 (distrib. as *C. album* L., var. *viride*). A southwestern species, now casually naturalized from South Carolina to New England.

**C. PAGANUM* Reichenb. KING WILLIAM COUNTY: border of cultivated field, Cohoke, no. 12,646. Although cited by Standley in *N. Am. Fl.* xxi¹. 23 (1916) as found "throughout the United States", there is no previous material in the Gray Herbarium from the Atlantic States from south of the District of Columbia.

**C. BOTRYS* L. HENRICO COUNTY: waste places and railroad ballast, South Richmond, no. 12,643. Although stated by Standley, l. c. 26, to occur "in nearly all parts of the United

States", we have found no record of it as definitely in Virginia, nor are there previous specimens in the Gray Herbarium from the Atlantic States south of Maryland and the District of Columbia.

**C. AMBROSIoidES* L., var. *CHILENSE* (Schrad.) Spegaz. (*C. vagans* Standl.). Often abundant as a coarse weed of cultivated ground, waste places and roadsides, from Prince George County to southern Southampton County. Our specimens are from Courtland, nos. 8252, 8707 and 9046. See p. 362.

Typical and now wide-spread *Chenopodium ambrosioides*, originating in South America but now generally dispersed in warm and temperate countries, has the stems and leaves glabrous or merely waxy-pruinose. It is relatively infrequent in eastern Virginia, where the white-villous or hirsute var. *chilense* abounds. Schrader's original description of *C. chilense* called for "caule hirto", etc., and, although he described it as annual, the plant in Virginia may become a strong perennial with coarse and deep roots. It has recently (1940) been collected in Randolph County, West Virginia (*J. C. Tosh*, no. 404); and Mr. Long informs me that it has just appeared in eastern Pennsylvania. It is also known from California. When treated as a species, merely on its pubescence, it is *C. vagans* Standl. (1916), substitute for *C. chilense* Schrad. (1832), not Pers. (1805). When it was made a variety by Spegazzini in 1902, he kept Schrader's name for the variety, as he had a right to do. I am taking the name var. *chilense* for the plant with cuneate lanceolate to oblong leaves as defined by Schrader and later by Moquin in DC. Prodr. xiii². 74 (1849). A minor form "foliis minoribus angustissimis" was called by Moquin *C. chilense*, β . *angustifolium* Moq. l. c., based upon a plant cultivated in Paris. Although this name is earlier in the varietal category than var. *chilense*, its application to our plant is too doubtful. It is called by Aellen *C. ambrosioides*, subsp. *chilense* (Schrad.) Aellen, var. *eu-chilense* Aellen, forma *angustatum* Aellen in Fedde, Repert. Spec. Nov. xxvi. 36 (1929).

**PORTULACA GRANDIFLORA* Hook. ESSEX COUNTY: damp sand back of beach of Rappahannock River at Ware's Wharf, northeast of Dunnsville, no. 13,332, a stray from cultivation. See p. 354.

SUBMERSED LEAVES OF NUPHAR ADVENA (PLATE 717, FIG. 1).—As it characteristically grows in the fluctuating water-levels and regularly exposed muds of our tidal estuaries, *Nuphar advena*

(Ait.) Ait. f. has the ovate to suborbicular leaf-blades erect and borne well above all but the highest tides. In this, one of its most characteristic habitats, only the firm and promptly emersed blades are developed. In their descriptions of many species with floating blades, *Nuphar microphyllum* (Pers.) Fern. (*Nymphaea microphylla* Pers.), *N. rubrodiscum* Morong (*Nymphaea rubrodisca* (Morong) Greene), *N. variegatum* Engelm. (*Nymphaea variegata* (Engelm.) G. S. Miller), *N. sagittifolium* (Walt.) Pursh (*Nymphaea sagittifolia* Walt.), etc., Miller & Standley in their detailed monograph, *The North American Species of Nymphaea*, Contrib. U. S. Nat. Herb. xvi. pt. 3 (1912), regularly described the filmy submersed leaves; but under *Nuphar advena* they did not mention them, correctly saying merely "Leaves erect, usually borne above the surface of the water, occasionally floating in deep water; blades . . . thick and firm". This is the situation in all the tidal margins of streams where Mr. Long and I have watched the plants in Virginia; when young plants are found in the tidal mud they have the submersed leaves quite like the full-grown emersed ones, only smaller.

In fresh rills, springy swales and shallow fresh ponds of James City County, Virginia, a relatively small-leaved plant with blades usually erect, the sinus as in *Nuphar advena* but the blades often nearly orbicular, though no more so than in some estuarine specimens, greatly puzzled us in the field. Study of it shows it to have the very numerous stamens (5–8 rows), the rays of the greenish disk and the other characters of *N. advena*. Its rhizomes are more slender and with more crowded scars and teeth than in the plant of tidal mud, but this may well be an environmental point. In the shallow pond-hole slightly east of Centerville this small-leaved *N. advena* abounds, the plants near shore with erect blades, those in deeper water with them floating; best of all, young plants in this relatively stable aquatic habitat develop filmy and translucent leaves (PL. 717, FIG. 1), in shape like the emersed ones but as flaccid as in the species which normally produce them. The series from fresh waters and swales is as follows, all from

JAMES CITY COUNTY: swampy thicket, Chisel Run, northwest of Williamsburg, no. 13,337 (leaves erect); swale at head of Chisel Run, clearing in woods south of Ewell, no. 13,338 (blades erect); shallow peaty pond-hole $\frac{1}{2}$ mile east of Centerville, no.

13,339 (blades floating or erect; filmy submersed leaves developed); muddy swale, Long Hill Swamp, east of Centerville, no. 13,340 (blades erect). See p. 358.

NUPHAR SAGITTIFOLIUM IN VIRGINIA (PLATE 718).—Along with the small boreal *Nuphar microphyllum*, with its nearly filiform petioles, narrow sepals, promptly deciduous petals and stamens, naked-based fruit and small stigmatic disk, another species, *N. sagittifolium* (Walt.) Pursh of southeastern North Carolina and northeastern South Carolina stands apart from the less easily recognized eastern American species of the genus. After prolonged field-study and examination of living, unpressed, and pressed material, the latter from all the larger American herbaria, Miller & Standley op. cit. 96, were able to cite it (as *Nymphaea sagittifolia*) only from the Coastal Plain of North Carolina, in the drainage system of the Cape Fear River from Fayetteville to the Wilmington region, and from Georgetown, South Carolina, summarizing their findings in the significant note: "It is exceedingly improbable that the species is found outside the States of North and South Carolina. We have seen no specimens from other States nor have we any information that clearly indicates the plant's occurrence elsewhere". Later collections have greatly increased the number of stations represented from North Carolina but they are all in a restricted area: from the Waccamaw and Little Pee Dee Rivers in northeastern South Carolina to the Cape Fear drainage, from Columbia County to the sea, in southeastern North Carolina. To this area should, perhaps, be added that of *Nymphaea ulvacea* Miller & Standley, described from Santa Rosa County in northwestern Florida. At least, I fail to get the sharp lines I should like between an isotype of *Nymphaea ulvacea* and specimens from the Lumber and Little Pee Dee systems in Scotland and Robeson Counties, North Carolina and in Horry County, South Carolina. In fact, these Carolina collections show that the emersed or floating blades may sometimes be of even broader outline than in the type of *N. ulvacea*.

So deeply rooted has become the view that *Nuphar sagittifolium* is confined to a restricted area, only 130 miles broad from north to south, in the Carolinas, that it has not been realized that it abounds within 100 miles of Washington and nearly 200

miles north of its supposed northern limit. In the Chickahominy River, however, from head of tide below Providence Forge for about 15 miles down-river, very characteristic *N. sagittifolium* (PL. 718, FIGS. 1-3) forms a continuous belt at mid-stream, the floating leaves 3-4 dm. long, 7-11 cm. wide. The Carolina material shows the floating leaves to range from 1.8-4 dm. long and 5-7.5 cm. broad, while emersed blades (on stranded plants) may be narrowly ovate and only 0.7-2 dm. long. In the Chickahominy, *N. sagittifolium*, so far as we yet know, is only near the head of tide, the long blades pointing up-stream as the tide comes in, down-stream as it goes out.

The broad tidal marshes of the Chickahominy are covered down to the low-tide level with typical erect-leaved *Nuphar advena*, with broad-ovate to subrotund blades and no filmy submersed leaves. In the broad belt between the marsh-area of *N. advena* and the mid-stream belt of *N. sagittifolium*, with narrow floating leaves and *Ulva*-like lanceolate translucent submersed ones, there are broad areas of a plant (PL. 719) with floating leaves (FIG. 1) narrowly ovate to oblong, shorter than but much broader than in *N. sagittifolium*, with beautiful masses of broad-oblong submersed leaves (FIG. 2), again broader and shorter than in *N. sagittifolium* and quite unlike the rarely translucent, submersed ovate blades of *N. advena*. Repeated search showed that, whereas both *N. advena* and *N. sagittifolium* mature plenty of good fruit, this common intermediate plant of the Chickahominy only rarely develops well filled capsules (FIG. 4). It is so clearly a hybrid of the two that I am so designating it below.

***NUPHAR SAGITTIFOLIUM** (Walt.) Pursh. NEW KENT COUNTY: deep fresh tidal water of Chickahominy River, southeast of Windsor Shades (Boulevard Postoffice), no. 13,335. CHARLES CITY COUNTY: similar habitat, near Cypress Bank Landing, no. 13,334. See p. 357.

* \times **NUPHAR interfluitans**, hybr. nov. (*N. advena* \times *N. sagittifolium*). TAB. 719. Planta inter *N. advena* et *N. sagittifolium* intermedia; laminis natantibus firmis opacis anguste ovatis vel ovato-oblongis 2-4 dm. longis 0.9-1.8 dm. latis obtusis sino acuto; laminis submersis flaccidis translucentibus, laminis petiolisque subaequantibus, late oblongis vel oblongo-ovatis 2-3.5 dm. longis 0.7-1.8 dm. latis margine crispatis apice rotundato sino late rotundato; floribus ut in *N. sagittifolium*; staminibus 3-5-

seriatis; disci viridiscantibus, radiis 8-10 lineari-lanceolatis attenuatis; capsulis rare distentis globoso-urceolatis.—VIRGINIA: growing in a broad band between mid-stream and margin of Chickahominy River, intermediate in position between *N. advena* of the tidal marshes and *N. sagittifolium* of mid-current. NEW KENT COUNTY: deep fresh tidal water, southeast of Windsor Shades (Boulevard Postoffice), September 9, 1941, *Fernald & Long*, no. 13,607 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.). CHARLES CITY COUNTY: similar habitat, near Cypress Bank Landing, July 26, 1941, no. 13,336, and September 11, 1941, no. 13,700. See p. 357.

Very rarely fruiting, most of the ovaries shriveling. Differing from the erect-leaved *N. advena* in its narrower floating leaves (PL. 719, FIG. 1) with narrower sinus, in the abundant filmy and translucent submersed leaves of narrower outline (FIG. 2) than in the rare submersed leaves of *N. advena* (PL. 717, FIG. 1), in the more slender rays (PL. 719 FIG. 3) of the disk and, viewed from above, in the greater uniformity in length of the rows of anthers (PL. 719, FIG. 3). In *N. sagittifolium* the submersed leaves (PL. 718, FIG. 2) and the floating leaves (PL. 718, FIG. 1) are much narrower and with narrower sinuses; the rings of stamens, viewed from above being similar (PL. 718, FIGS. 3 and 4).

PLATE 717 is of NUPHAR ADVENA: FIG. 1, young plant with translucent filmy submersed leaves, $\times 1$, from east of Centerville, Virginia, *Fernald & Long*, no. 13,339; FIG. 2, flower aid partly open to show cone of young stamens, $\times 1$, from no. 13,339.

PLATE 718, of N. SAGITTIFOLIUM: FIG. 1, floating leaf, $\times 3/7$, from Chickahominy River, Virginia, *Fernald & Long*, no. 13,334; FIG. 2, submersed leaf, $\times 3/7$, from no. 13,334; FIG. 3, flower partly opened to show stamens, $\times 1$, from Chickahominy River, no. 13,334; FIG. 4, flower, partly opened to show stamens, $\times 1$, from Wilmington, North Carolina, 1858, *McRee*.

PLATE 719, \times N. INTERFLUITANS, all from the TYPE: FIG. 1, floating leaf, $\times 2/5$; FIG. 2, submersed leaf, $\times 2/5$; FIGS. 3 and 4, flower and fruit, $\times 1$.

*ACONITUM UNCINATUM L., var. **acutidens**, var. nov. (TAB. 720, FIG. 2-4), foliorum foliolis cuneatis apice acuminatis acute subinciseque serratis.—Mountains of western Maryland to those of North Carolina and Tennessee; inner Coastal Plain of southeastern Virginia. The following are characteristic: MARYLAND: Oakland, Garrett County, September, 1881, *J. D. Smith*. VIRGINIA: mts., 1843, *Asa Gray et al*; Bedford County, October 6, 1871, *A. H. Curtiss*; rich wooded slopes and spring-heads along Nottoway River, above Carey Bridge, Southampton County, May 7, 1940, foliage, *Fernald & Long*, no. 11,652; rich woods along brook entering Nottoway River below Double Bridge, north of Orion, Greensville County, June 13, 1940, foliage, *Fernald & Long*, no. 12,079, August 21, 1940, foliage, no. 12,654,

September 14, 1941, young flower-buds, no. 13,613, October 13, 1941, flowers very scarce, no. 13,945 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.). NORTH CAROLINA: shady banks, Biltmore, September 9, 1897, *Biltmore Herb.*, no. 72^a; wet rocks, "Pink Beds", 4000 feet alt., Pisgah Forest, September 1, 1908, *House*, no. 4001; rich ravines, alt. 5000 feet, Great Smoky Mountains, Swain County, August 18, 1891, *Beardslee & Kofoid*. TENNESSEE: deep woods along "K. and N. G. R. R.", October 2, 1902, *Ruth*, no. 389; along brooks on western slopes of Mt. LeConte, alt. 4500 feet, August 12, 1930, *Svenson*, no. 4037. See p. 374.

Typical *Aconitum uncinatum* L. Sp. Pl. ed. 2, i. 750 (1762) is the extreme of the species which early reached European gardens. Its middle and upper leaves (FIG. 1) have broader and less cuneate and less acuminate leaflets or divisions, these with shorter and blunter teeth, the plant illustrated in Bot. Mag. xxviii. t. 1119 (1808). Its leaves were described by Linnaeus "*Folia triloba s. quinqueloba, angulato-dentata*" but, although he gave the "*Habitat in Philadelphia*" it is not now admitted as a native of that city. It seems, however, to be a plant usually of lower altitudes than var. *acutidens*: low woods, near Great Falls, Virginia; "*In vicinis Washington, D. C.*"; Falls of Saluda River, Greenville Co., South Carolina; etc. In southeastern Virginia it occurs in HENRICO COUNTY: woods, campus of University of Richmond, October 10, 1931, *J. T. Johnson*.

IN PLATE 720, FIG. 1 is a characteristic leaf of typical A. UNCINATUM, $\times 1$, from Great Falls, Virginia, September 24, 1915, *Holm*; FIGS. 2-4, flowering tip and characteristic portions of leaves, $\times 1$, of type and topotypes of var. ACUTIDENS.

*PERSEA PALUSTRIS (Raf.) Sarg., forma **laevifolia**, f. nov., foliis subtus glabris vel subglabris.—Nansemond County, VIRGINIA: wet woods near lumber camp of Camp Lumber Co., Great Dismal Swamp, southeast of Whitmarsh School, July 19, 1939, *Fernald & Long*, no. 10,652 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.); woods and thickets back of sandy western shore of Lake Drummond, Great Dismal Swamp, September 15, 1941, *Fernald & Long*, no. 13,616; swampy depressions in pine barrens northeast of Sandy Landing, south of South Quay, August 27, 1939, *Fernald & Long*, no. 11,039. See p. 366.

. Typical and, in southeastern Virginia, common *Persea palustris* has the leaves densely soft-pubescent to tomentulose beneath; forma *laevifolia* has the lower surface as smooth as or smoother than in *P. Borbonia* (L.) Spreng., but the outline of the leaf is

that of *P. palustris*. No fruiting trees of the glabrescent form have yet been found but it is improbable that they will show material departure from *P. palustris*. In making the combination *P. palustris* (Raf.) Sargent in Bot. Gaz. lxxvii. 229 (1919), Sargent based it on "*Tamala palustris* Rafinesque, Fl. Tellur. 137. 1838." When Flora Telluriana, a work published in several separately paged parts, is looked up we find no part with as many as 137 pages, and the last part, "pars iv et ult.", bears the date 1836 (now known to be 1838). *Tamala* is not in the index to any of the parts. So, having become familiar with the loose bibliography of both authors concerned, we search and eventually find that *Tamala palustris*, "fol. lanceol. subtus pallidis pubescens," etc., was published in Sylva Telluriana, 137 (1838). By our present easy-going practice, however, Sargent is accepted as author of the combination.

*CAPSELLA GRACILIS Grenier. PRINCE GEORGE COUNTY: border of cultivated field near James River, Windmill Point, Flowerdew Hundred, no. 13,014; apparently the first record from North America. See p. 346.

*CARDAMINE LONGII Fernald. Fresh tidal shores, especially in mud and among other taller vegetation; heretofore known only from the original stations on tidal mud of Sagadahoc County, Maine, whence it was introduced by the late Fayette F. Forbes to the lower Charles River in eastern Massachusetts. Recently found by Mr. Long on tidal mud at the head of Chesapeake Bay, near the mouth of the Susquehanna. PRINCE GEORGE COUNTY: James River, Windmill Point, Flowerdew Hundred, no. 13,015; James River, Jordan Point, no. 13,016. CHARLES CITY COUNTY: Chickahominy River, Cypress Bank Landing, no. 13,345. NEW KENT COUNTY: fresh tidal shore of Chickahominy River, above Lanexa, no. 13,017. KING WILLIAM COUNTY: Mattaponi River at Horse Landing, near King William Courthouse, no. 13,018; Mattaponi River, northwest of King William Courthouse, no. 13,019. KING AND QUEEN COUNTY: Mattaponi River, Walkerton, no. 13,020. CAROLINE COUNTY: Rappahannock River, northwest of Return, no. 13,947. See pp. 346, 347 and 356.

ARABIS LAEVIGATA (Muhl.) Poir. Local range extended into JAMES CITY COUNTY: rich wooded slopes by James River, Grove Landing, southeast of Grove, no. 13,346.

*HEUCHERA AMERICANA L., var. **heteradenia**, var. nov. (TAB. 721, FIG. 2 et 3) foliis magnis, laminis deinde 0.8–1.5 dm. longis paginis superioribus strigoso-pilosis; petiolis scapis rha-

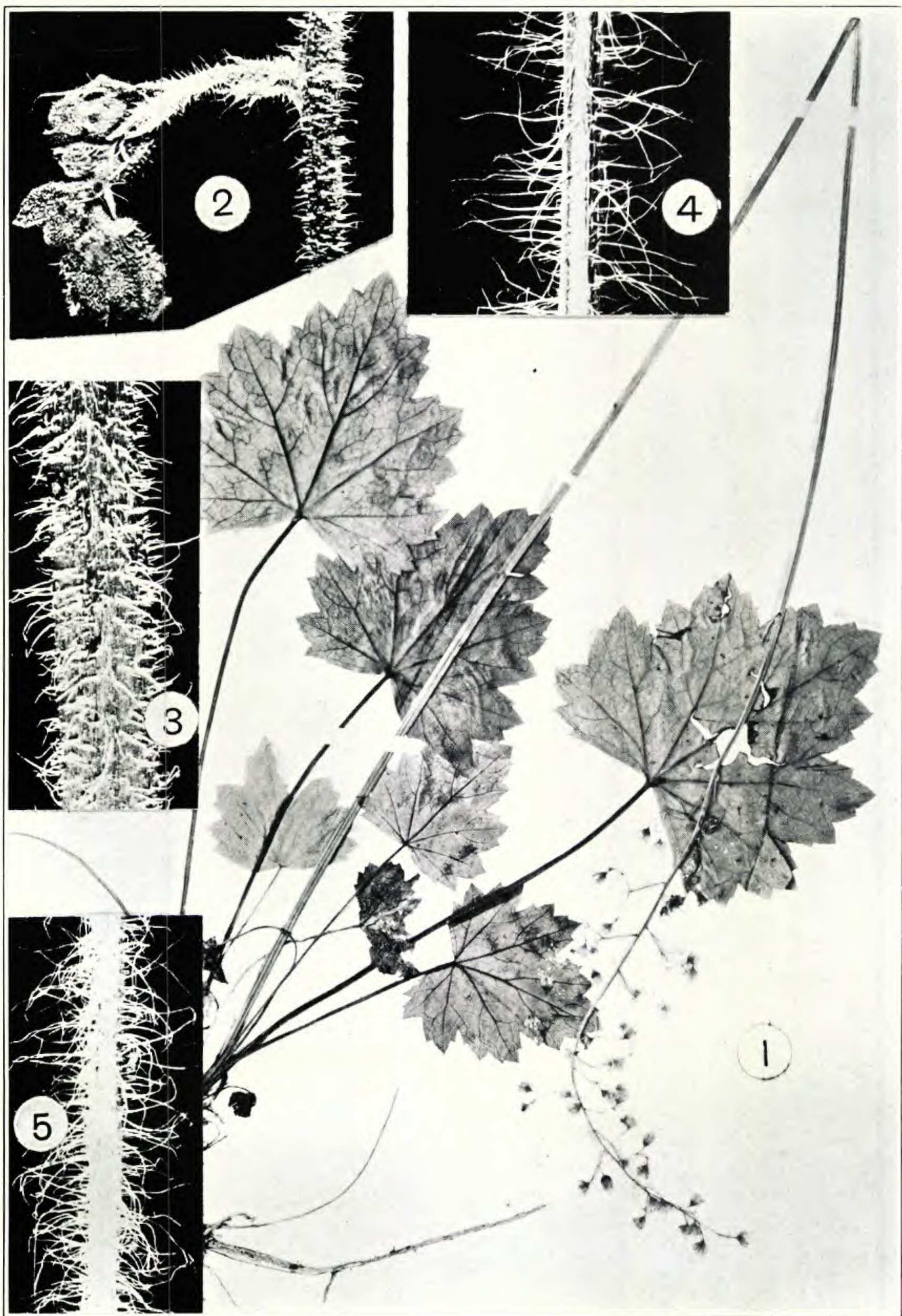


Photo. B. G. Schubert.

HEUCHERA AMERICANA, var. SUBTRUNCATA, $\times \frac{1}{2}$, FIG. 1; var. HETERADENIA, $\times 4$, FIGS. 2 and 3; var. HIRSUTICAULIS, $\times 4$, FIG. 4; var. INTERIOR, $\times 4$, FIG. 5.



Photo. B. G. Schubert.

RUBUS DEFLECTIONIS. $\times 1$.

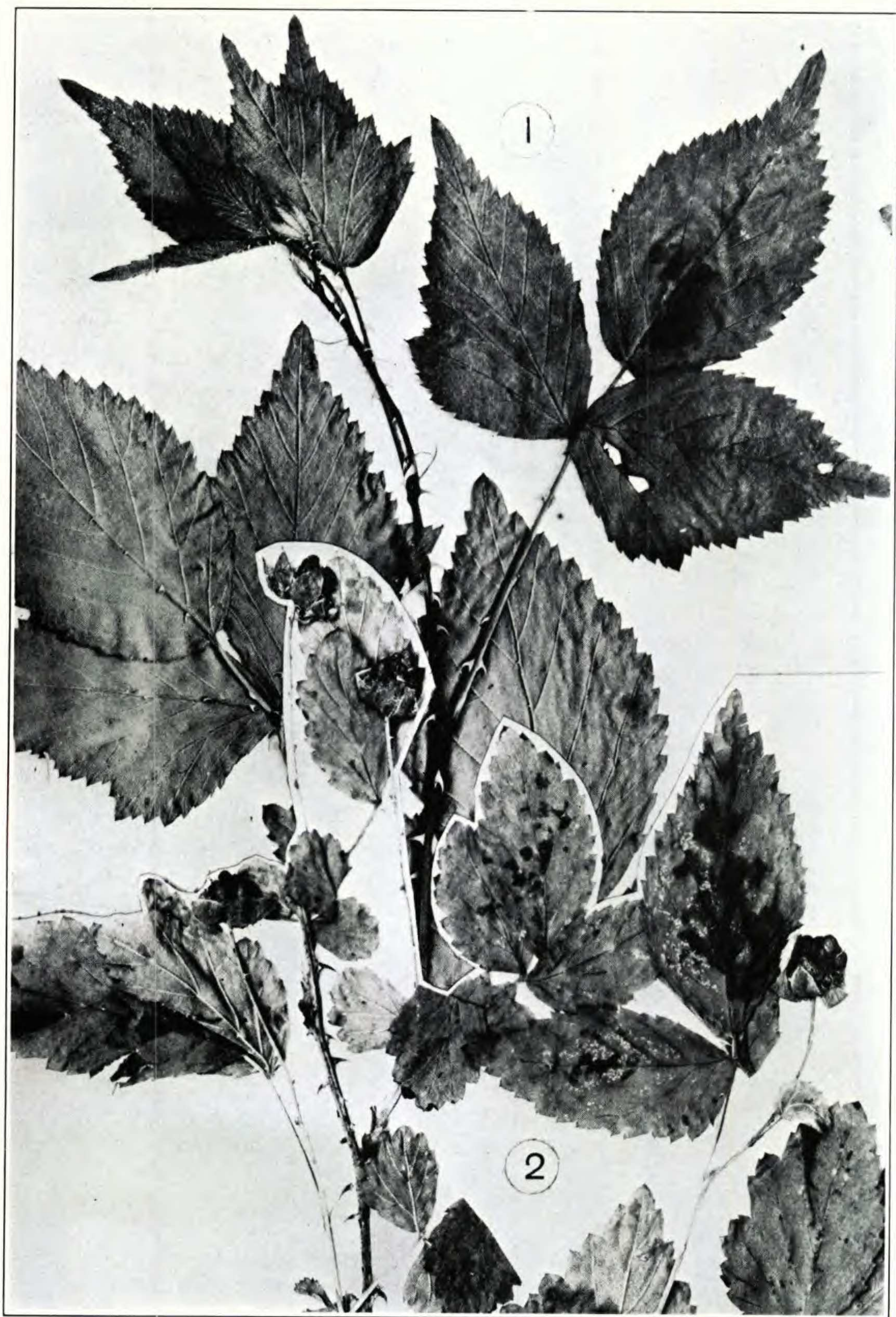


Photo. B. G. Schubert.

RUBUS DISSITIFLORUS, $\times 1$.